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★ THE FOUNDRYMEN'S *Own* MAGAZINE

American Foundryman

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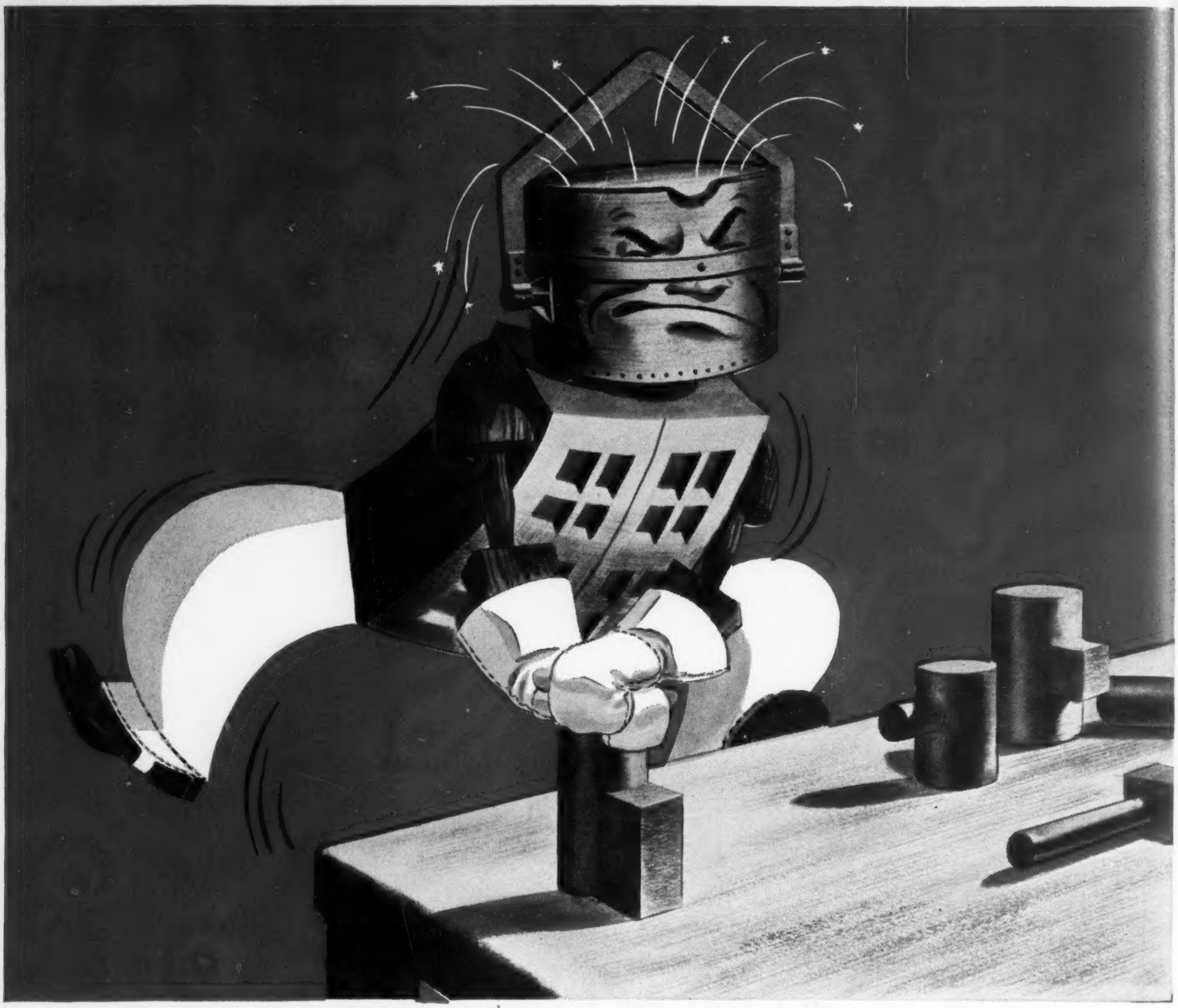

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What One Member Says . . . ABOUT ADVANTAGES OF A.F.S. MEMBERSHIP

BASICALLY, membership in A.F.S. is job insurance.* It is the one society which represents all cast metals. It is the one society which gives the individual the newest technical and practical information. Adequate technical knowledge of foundry practice is essential to the individual and valuable to the employer.

A.F.S. gives help in apprentice training and provides incentive and reward through the annual apprentice contest. A.F.S. cooperates with the Foundry Educational Foundation at the college level and is active directly in foundry educational programs at the high school and trade school levels.

A.F.S. is developing text books for foundry courses which will replace antiquated and obsolete texts. These new books will properly present the merits of castings versus forgings and other fabrications, as well as covering up-to-date foundry practice.

A.F.S. provides cooperative exchange of information for planning chapter educational courses.

A.F.S. has a full time technical director and assistants. A.F.S. sponsors direct research in various laboratories and universities . . . results are available to all members as well as to non-members. A.F.S. maintains separate divisions for the study of the specific problems in each metal and in each general class of foundry activity, such as patternmaking, sand, steel, brass and bronze, etc.

A.F.S. sponsors chapters in each foundry area so that foundrymen may obtain new information conveniently at eight or nine monthly meetings each year. Chapter membership is free to A.F.S. members. The National Office assists chapters in obtaining capable speakers.

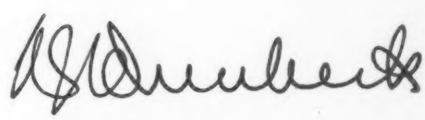
Assistance is given chapters holding regional foundry conferences so that the benefits of new developments are quickly available with a minimum of travel and minimum expenditure of time.

More than 500 foundrymen serve without monetary compensation on A.F.S. technical committees and all Society members are eligible for and welcomed into such service. A.F.S. has a technical convention yearly and a foundry exhibit every other year. The advantages of seeing in one place all new developments in equipment and materials is obvious.

A.F.S. publishes all technical papers from the Convention in the annual bound volume of TRANSACTIONS OF A.F.S. This gives each member the opportunity of assembling a fine foundry library. In addition, A.F.S. publishes authoritative books on foundry practice which are not obtainable elsewhere. These include CAST METALS HANDBOOK, ANALYSIS OF CASTING DEFECTS, and many others for every phase of the industry.

Each member of A.F.S. receives AMERICAN FOUNDRYMAN monthly. Called *The Foundrymen's OWN Magazine,* it is the official organ of the Society and brings to the members understandable articles on every new development in foundry practice as soon as the information is available.

Every man enjoys the companionship of men with similar interests. The A.F.S. offers opportunity for new friends and for discussion of mutual problems and interests.



N. J. DUNBECK
National Director
AMERICAN FOUNDRYMEN'S SOCIETY

*A schedule of the new A. F. S. dues—"job insurance premiums"—will be found on page 30 of this issue.

Elected a National Director of A.F.S. at the last Annual Meeting, N. J. Dunbeck has served on many of Society's sand committees and has written extensively on sand technology. He has presented papers on the subject at most A.F.S. chapters and at regional conferences and national conventions. Immediate past chairman of the Central Ohio Chapter, Mr. Dunbeck has been vice-president of Eastern Clay Products, Inc., Jackson, Ohio, since 1936. He is a graduate of Catholic University of America. Summers, while studying for a bachelor of science degree in chemical engineering, he worked in foundries. He established Eastern Clay Product's first laboratory on going to work in 1926, and later became production manager.

INTERNATIONAL FOUNDRY CONGRESS

Holds First Postwar Meet in Czechoslovakia

A THOUSAND FOUNDRYMEN AND TEN NATIONS met to exchange views on a subject of common interest—advancement of the art of founding—as the International Foundry Congress returned to the city of its birth, Prague, Czechoslovakia, for its first meeting since World War II.

Technical sessions of the Congress lasted four days, September 15 through 18, and featured more than 40 papers presented on four principal topics: metallurgical processes in foundry practice, special foundry techniques, design of castings from the point of view of the founder, and testing of materials.

The Congress was timed to run concurrently with Czechoslovakia's greatest annual attraction, the Prague Fall Fair, which featured among its exhibits of national arts and crafts a Foundry Institute Exhibition showing foundry equipment and products, foundry teaching methods, micrography of castings, plans for proposed foundries, and an exhibition of the work of foundry apprentices. A special exhibit at Prague's Museum of Industry was devoted to an Exposition of Artistic Castings, many of them several centuries old. In addition to these attractions, delegates whose schedules permitted were given an opportunity to visit the city's food processing plants, social institutions, musuems and other points of interest.

Opening the regular sessions of the Congress on September 15, Dr. Ing. F. Pisek, chairman of the Czechoslovakia Foundrymen's Association, extended greetings to the visiting delegates on behalf of the Association and pledged that organization's cooperation with other nations in the study of foundry problems. Dr. Pisek cited the many changes that have taken place in the industry since the formation of the International Foundry Congress at Prague in 1933, and drew a parallel between industrial conditions in Europe at that time and those of today.

Czech Minister Welcomes Delegates

Following Dr. Pisek's opening address, M. Kliment, Czechoslovakian Minister of Industry, welcomed delegates from France, Belgium, Holland, Russia, Poland, Hungary, Bulgaria, Italy, Switzerland and the United States on behalf of his government. The American Foundrymen's Society was represented at the Congress by Lester B. Knight of Lester B. Knight & Associates, Chicago, consulting engineers.

After a brief address by Dr. Ing. Jicinsky, vice- general director of the Czechoslovak Metallurgical Works, who extended the courtesy and cooperation of the Czech foundry industry to delegates from other nations, Dr. Leonard, delegate from Belgium and vice-president of the International Committee, thanked the Czechs on behalf of the visitors and proposed sending a telegram to President Klement Gottwald of the Czechoslovakian Republic in token of appreciation

Lester B. Knight of Lester B. Knight & Associates (center), official delegate of the American Foundrymen's Society to the International Foundry Congress, held in Prague, Czechoslovakia, September 15-18, shown conferring with (left) Dr. Ing. L. Jenicek, honorary secretary of the Czeckoslovak Foundrymen's Association, and M. Kliment, Czechoslovakian Minister of Industry, who was host to the overseas delegates at an official reception preceding the technical sessions.

for their reception. The suggestion was unanimously approved by the delegates.

Dr. A. M. Plesinger addressed the Congress on the past, present, and future of the Czech foundry industry, comparing the industry's present status with that of 1929. Following this, Dr. Leonard of Belgium cited the many unsolved problems that challenge the modern foundryman.

Winners of the All-Czechoslovakia Apprentice Contest were awarded prizes by Minister of Industry Kliment, in commemoration of the "Father of the Czech Republic," Jan Masaryk, who was an honorary member of the Association.

Select Holland For '49 Congress

Meetings of the International Committee of Foundrymen's Associations and the International Commission were held during the Congress. The International Committee decided that the next Congress will be held in Holland in 1949, and voted to reinstate the Italian Foundrymen's Association, dropped from the membership role during World War II.

The Czechoslovak Foundry Society was voted the privilege of selecting the next vice-president of the International Committee. Belgium's Dr. Leonard, this year's vice-president, will succeed to the presidency of the Committee in 1949, and will in turn be succeeded by the Czech appointee in 1950.

The 40-odd technical papers and reports that made up the bulk of the Congress' technical sessions were largely on an international level and many of them were read in several languages. Included among these and translated into Czech for the benefit of the majority of foundrymen present was a paper by A. F. S. Delegate Lester B. Knight on *"Modernization of the Small Foundry."*

Aside from the presentation of a few foreign exchange papers, the bulk of the technical addresses were made by members of the Czechoslovak Foundrymen's Association and covered such diversified foundry subjects as personnel training, induction furnace operation in the foundry, cupola practice, centrifugal casting, machining of castings, spectrographic analysis of castings, pressure die casting, foundry mechanization, ultra-sonic testing methods, and exploitation of atmospheric pressures in casting. All technical papers presented at the Congress will later be made available in the International Foundry Congress *"Transactions."*

Plan World-Wide Iron Research

The International Committee for the Testing of Cast Iron elected its 1949 officers and announced formulation of plans for world-wide research into the subject. The International Committee for the Study of Casting Defects set up plans for a detailed study, to be reported at the 1949 Congress.

A formal banquet concluded the regular sessions of the Congress on September 18 and featured presentation of honorary life memberships in the Czechoslovak Foundrymen's Association to three of its charter members, Drs. Pisek, Benda and Stibr.

Dr. Ing. Jenicek, honorary secretary of the Association, thanked the visiting delegates and complimented them on their contributions to the success of the 1948 Congress. The ceremonies concluded with an address of thanks to the membership by Dr. Pisek.

On the day following, virtually all of the delegates visited several Prague foundries and saw the castings exhibits at the Prague Fall Fair and the Museum.

On September 19, some 60 members, including 30 from foreign countries, left on an extensive one-week tour of Czechoslovakian industries. The tour included inspection of foundries in Ostrava, Povazska Bystrica, Trnava, Bratislava, Brno, Plzen, and Marianske Lazne, and provided for a brief stop at the resort town of Trencaske Teplice in Slovakia. All Czech foundries are nationalized under the present regime.

The 60 foundrymen, traveling by special train, were warmly received throughout the country and were honored guests at several dinners and village fetes. The tour culminated in Plzen, where the delegates were shown through the famous Skoda Works and the Pilsen Brewery and were later guests at a banquet. *(For a report of this tour by A.F.S. Delegate Lester B. Knight, see next month's* AMERICAN FOUNDRYMAN.*)*

International Casting Defects Book Written By Professor Gierdziejewski

HELD UP BY THE WAR, the *Atlas of Casting Defects* sponsored by the International Committee on Foundry Defects has been published. Defining 34 defects found in castings, the book was written by Professor Kazimierz Gierdziejewski, president of the committee. Though the text is in Polish, the captions under the 38 illustrations are in six languages—Polish, Russian, Czech, French, English, and German. Defects in the 56 page book are classified under: dimensional variations; defects due primarily to sand; inclusions; cold shuts, misruns, etc.; blows, gas holes, etc.; cold cracks and hot tears; shrinkage; and segregation, tin sweat, hard spots, and miscellaneous.

The Committee on Foundry Defects, meeting during the International Foundry Congress in Prague, Czechoslovakia, September 15-18, decided to continue centralization of documents. This will be transferred from London to Paris where the Centre Technique de Fonderie will assist in the work.

Two books on casting defects issued prior to the *Atlas* sponsored by the International Committee are the *Atlas of Defects in Castings,* prepared by a subcommittee of the Technical Council, Institute of British Foundrymen, and the A. F. S. ANALYSIS OF CASTING DEFECTS. A 148-page book, the A. F. S. publication describes and illustrates 31 basic casting defects and contains 101 figures.

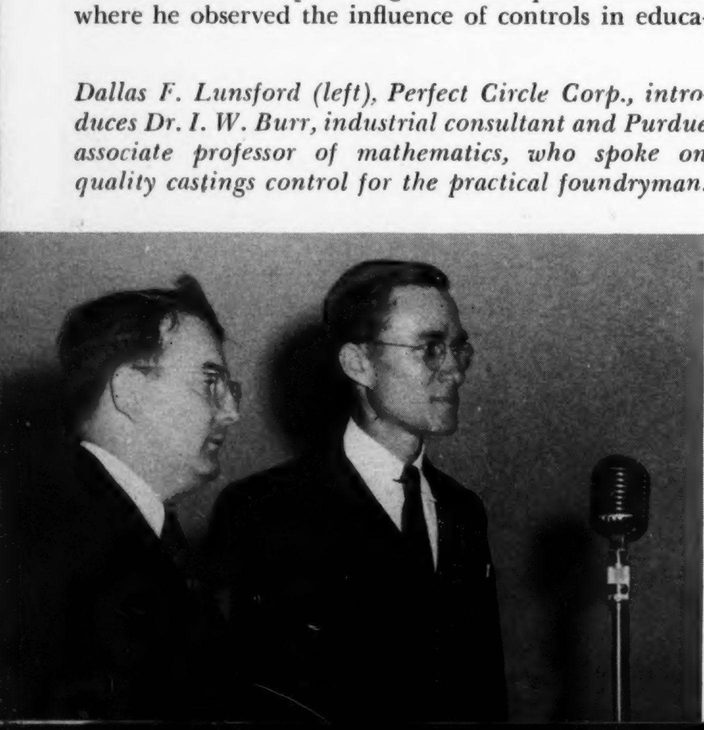
A.F.S. President W. B. Wallis (left) greets Dean A. A. Potter (center) and Prof. H. A. Bolz of Purdue University's School of Engineering at the opening of the Regional Metals Casting Conference, held at Purdue.

METALS CASTING CONFERENCE FEATURES MELTING PROBLEMS

THE FIRST REGIONAL FOUNDRY CONFERENCE held at Purdue University since 1941 was attended by over 200 operating and managing foundrymen. Meeting November 4 and 5 on the school's campus at Lafayette, Ind., the foundrymen discussed current melting problems due to raw materials shortages, training, foundry modernization and meeting casting specifications at the Metals Casting Conference.

Non-technical features of the conference were a banquet the first night and a tour of the University the afternoon of the second day. At the banquet, foundrymen heard Dr. Frank Sparks, president of Wabash College, Crawfordsville, Ind., discuss the need for educational systems free of political control. A former industrialist turned college president, he recently returned from a trip through 11 European countries where he observed the influence of controls in education on their economic, social, and political life.

Dallas F. Lunsford (left), Perfect Circle Corp., introduces Dr. I. W. Burr, industrial consultant and Purdue associate professor of mathematics, who spoke on quality castings control for the practical foundryman.



One of seven regional foundry conferences held this year throughout the United States and Canada, the Purdue meeting was sponsored by the Michiana and Central Indiana Chapters of the American Foundrymen's Society and by the university. Conference chairman was C. T. Marek, assistant professor of engineering shop practice. R. W. Lindley, chairman of engineering shops, was Conference secretary. Other conference committee members were: Paul H. Harlan, Electric Steel Castings Co., Indianapolis, Ind.; Dr. F. T. McGuire, Sibley Machine & Foundry Corp., South Bend, Ind.; H. A. Bolz, head, department of general engineering; Dr. G. M. Enos, professor of metallurgical engineering; and M. M. McClure of the technical extension division.

Following registration in the lobby of the Purdue Memorial Union, the conference opened the morning of Nov. 4 in the faculty lounge with Professor H. A. Bolz presiding. In welcoming the foundrymen to Purdue, Engineering Dean A. A. Potter cited the value of bringing industrialists, the faculty, and the students together. All freshman at Purdue take a course in foundry practice, he said, in explaining that the purpose of the school's curricula is to teach the engineering process. Dean Potter urged foundries to hire more engineering college graduates regardless of the specific courses they have studied.

A. F. S. President W. B. Wallis congratulated Purdue and the Michiana and Central Indiana Chapters on organizing the conference. Pointing out that it was the seventh regional conference scheduled for 1948-49, he expressed hope that it would be held annually.

"Quality Control for the Practical Foundryman" by Dr. I. W. Burr, associate professor of mathematics, was the first technical paper of the conference. In intro-

ducing Dr. Burr, Dallas F. Lunsford, Perfect Circle Corp., New Castle, Ind., stated that his company saved about $50,000 in the first year it used quality control.

In a paper which appears in this issue of AMERICAN FOUNDRYMAN, pages 43-47, Dr. Burr showed that visual examination of a graph may be misleading unless the data are analyzed by simple arithmetic. Stating that statistical information is useful wherever variables are involved, he said that statistical control prevents two types of mistakes: failure to take action on sufficient evidence, and taking action on insufficient evidence. He illustrated and explained the various types of control charts and showed that quality control involves only simple calculations.

The afternoon sessions were devoted to foundry mechanization and foundry personnel problems. Speakers at the first session were A. F. S. National Director B. L. Simpson and R. L. McIlvaine, both of National Engineering Co., Chicago. Beauford E. Gavin, National Malleable and Steel Castings Co., Indianapolis, Ind., presided.

Mr. Simpson said that the complexity of foundry operations today makes selection and training of foundry supervisors more difficult than in previous years and suggested looking to engineering school graduates and outside the foundry industry. That this source of personnel may not react favorably to the industry was shown by a survey of students at a mid-west engineering school. Lack of modern production facilities and failure to use up-to-date techniques were common student criticisms. Mr. Simpson elaborated on the need for modernization if the foundry industry is to secure this type of prospective supervisor.

Mr. McIlvaine showed a motion picture comparing a modernized foundry with a foundry which was poorly organized and arranged. In his running commentary he pointed out the good and the poor practices and emphasized good housekeeping as a first step in modernization.

Dr. R. J. Field, associate professor of industrial engineering, presided at the second afternoon session, on foundry personnel problems. Speakers were Joe H. Ayres, Armco Steel Corp., Middletown, Ohio, who spoke on procurement, James G. Purvis, Armco training supervisor, who discussed training, and Dr. Ralph L. Lee, General Motors Corp., Detroit, who talked on the personal element in employee relations.

Mr. Ayres said that people have several reasons for wanting to work in a plant such as: economic (which he believes is overemphasized by many employers), desire for recognition, security, and opportunity to learn and to get ahead. To give these, a plant must have a carefully planned basic statement of policies, a program to carry out the policies, and an organization to carry out the program. This can be done just as well in a small plant as in a large one, Mr. Ayres said.

He emphasized the importance of dealing with people on the basis of how they feel, not how we think they ought to feel. Communication with people in a plant can be maintained through meetings, a weekly or monthly news sheet, and recognition of individuals.

Training is one of management's major responsibilities, according to Mr. Purvis, who looks on employee training as the development of individuals. Training is for new men, for teaching old employees

Featured speakers at the Metals Casting Conference were, left to right, Dr. Ralph L. Lee of General Motors Institute, and Joseph H. Ayres and James G. Purvis of the Armco Steel Corporation, Middletown, Ohio.

new techniques, for developing men for more than one job, and for developing personnel to the limit of their capacities, the speaker said.

Mr. Purvis urged the use of the schools which he said are all willing to cooperate in holding classes for industrial employees. He brought out the importance of management training in which the supervisor trains those below him in supervisory problems.

In setting up a training program, Mr. Purvis suggested using the following questions as a guide: What is the program expected to accomplish? What is the program content? What is the best way to present the material? How can the information be applied

Members of the Conference Committee of the Metals Casting Conference were, left to right, seated: G. M. Enos, professor of Metallurgical Engineering; M. M. McClure, Purdue Technical Extension Division; Prof. H. A. Bolz, head of General Engineering. Standing, left to right: R. W. Lindley, Purdue Engineering Shops; F. T. McGuire, Sibley Machine & Foundry Corp.; P. H. Harlan, Electric Steel Castings Co.; Keith Glancy, Purdue Technical Extension Division; and C. T. Marek, assistant professor of Shop Practice.

continuously so that training is carried on and on?

What followers want in a leader* was explained by Dr. Lee in discussing the personal element in employee relations. A follower wants a leader who is not afraid, who believes his work is important, recognizes him as a person and can tell him what's what without losing his temper. A leader should understand his followers, according to Dr. Lee, he should be a good listener but turn a deaf ear to gossip, and should demonstrate a job without showing off. Followers prefer the leader who is loyal to his company, and who seems to be trying to work himself out of his own job and his men into it.

The follower wants a leader he can get to when he really needs him and can get away from when he's through with him, said Dr. Lee.

College President Addresses Banquet

Dr. Frank Sparks, president of Wabash College, was principal speaker at the banquet ending the first day of the Metals Casting Conference. Held in the south ballroom of the Memorial Union, the banquet was attended by foundrymen, educators and students interested in the foundry industry and in education. Leaders of the various student technical and honorary organizations on the Purdue campus were guests. Presiding at the banquet was Paul H. Harlan, Electric Steel Castings Co., Indianapolis, Ind.

Conference Chairman C. T. Marek made a plea for hiring engineering students for summer jobs. This would give students an opportunity to get acquainted with the industry, and give foundrymen a chance to size-up the students, he said.

Dr. Sparks was introduced by Dr. Frederick L. Hovde, president of Purdue. "A free society cannot long exist with politically controlled educational systems, nor can freedom of education exist in a politically controlled society," said Dr. Sparks. He based his comments on observations made during a trip through 11 European countries where he studied political control of education.

*"*Are Leaders Born or Made?*" by Dr. Ralph L. Lee, contains quiz for rating leaders. See AMERICAN FOUNDRYMAN, March, 1946, pages 32-34.

Second day sessions of the conference included two simultaneous morning sessions on making the best use of raw materials in melting, and an afternoon meeting on castings procurement. Divided into ferrous and non-ferrous groups, foundrymen heard brief talks on present day melting problems and participated in round-table discussions which followed.

Prominent Indiana Founders Speak

Principal speaker for the ferrous group was R. G. McElwee, Vanadium Corp. of America, Detroit, who is chairman of the A.F.S. Gray Iron Division and of the Cupola Research Committee. Other speakers representing specific ferrous interests were: gray iron, R. H. Bancroft, Perfect Circle Corp., New Castle, Ind.; malleable, William Ferrell, Auto Specialties Manufacturing Co., St. Joseph, Mich.; and steel, G. C. Dickey, Harrison Steel Castings Co., Attica, Ind. Dr. F. T. McGuire, Sibley Machine and Foundry Corp., South Bend, Ind., presided.

Mr. McElwee commented on general ferrous melting problems, pointing out the importance of slag control, and mentioned briefly current work of the Cupola Research Committee.

Cites Ferrous Materials Shortage

"The problem of obtaining essential raw materials of satisfactory quality and in sufficient quantity has plagued gray iron foundrymen since the war ended," said Mr. Bancroft. He described experiences in his plant where it became necessary to convert some melting operations to indirect arc furnaces melting 100 per cent cast iron borings and steel turnings. In other operations pig was reduced to 15 per cent but, the speaker pointed out, this is not economical because of the disproportionately high price of scrap.

Describing in detail his experience with substitution of fuels, Mr. Bancroft explained that Perfect Circle Corp. had tried a smaller grade of by-product coke than normally used because it was obtainable, a high sulphur coke, three varieties of beehive coke, two grades of anthracite coal, coke briquettes, and charcoal briquettes. Trouble was encountered whenever the bed in the cupola was made from any material

Officers of ten Purdue University student engineering societies who took part in the Conference and are pictured here represent Tau Beta Pi, Pi Tau Sigma, Eta Kappa Nu, ASME, AIME, SAE, EAM, AICE, ASCE.

Speakers at the Metals Casting Conference were, left to right, A.F.S. National Director Bruce L. Simpson, B. E. Gavin, National Malleable & Steel Castings Co.; and R. L. McIlvaine of the National Engineering Co.

other than the by-product coke selected by the plant after years of experimenting.

Friability of substitute fuels and increased slagging troubles were drawbacks to their use. Briquettes made from coke breeze and bonded with cement seemed to be satisfactory but expense and shortage of cement resulted in discontinuance of their use. As a result of the breaking up of the substitute fuels, pressures increased and auxiliary blowers were required. Melting speed was reduced. A 36 in. cupola could successfully use a higher proportion of substitute fuel than a 48 in. unit, Mr. Bancroft said, the figures quoted being 30 per cent and 12 per cent, respectively.

Outlines Malleable Melting Problems

"Think of the overall picture of castings production," said Mr. Ferrell, in outlining melting problems of malleable foundries. There is no use in trying to conserve hard-to-get melting stock and fuel if the metal is to be wasted later in the process through careless pouring or molding, or through faulty design, he explained. A discussion by the designer, the casting producer, and the user was recommended as the logical starting point for conservation of raw materials.

Acknowledging the current difficulties in getting the proper type of melting stock, Mr. Ferrell stated that careful consideration is required whether the foundryman uses a cupola, an electric furnace, or an air furnace. Proper scrap size, and proper size and type of fuel in cupola melting especially, are essential, the speaker said. He discussed the advantages of moisture control and heated blast, and described the practice used at Auto Specialties.

Suggests Use of Carbon Steels

Mr. Dickey suggested that best use of raw materials might well start with use of carbon steels instead of alloy steels wherever possible, developing the desired properties by careful heat treatment. He said uniform results as well as conservation of raw materials could be achieved through standardization of melting practice. On recarburization, Mr. Dickey said that charcoal could be used instead of pig but that this practice does not prove economical in the long run.

Oxygen can be used for decarburization and also for melting down in cases where added furnace capacity is needed but another furnace is not warranted.

Foundrymen at the non-ferrous session heard Hiram Brown, Solar Aircraft Co., Des Moines, Iowa, assisted by Arthur T. Ruppe, Bendix Products Division, Bendix Aviation Corp., South Bend, speaking on light metals, and Robert Langsenkamp, Langsenkamp-Wheeler Brass Works, Inc., Indianapolis, speaking on brass and bronze. Presiding at this session was V. S. Spears, American Wheelabrator & Equipment Corp., Mishawaka, Ind.

Two reasons for making the best use of raw materials in melting given by Mr. Brown are to avoid depletion of natural resources, and to minimize metal expense. In his talk (published in the November issue of AMERICAN FOUNDRYMAN, pages 63-65) he suggested segregating risers and sprues according to composition, prior to remelting. Dross, shavings, grindings, etc., should be segregated and sold to the smelters, he said.

The presence of beryllium, calcium, and other elements is complicating the scrap situation and care must be used in buying or undesirable tramp elements will be introduced into the melt, Mr. Brown said. Aluminum should not be stored out of doors but if it is, drying at 900 F is recommended.

Cites Copper Base Melting Procedures

Mr. Ruppe reviewed light metal practice at Bendix and was followed by Mr. Langsenkamp who outlined melting procedures for copper-base alloys. Any type of melting unit will produce good or bad metal depending on the way it is used, he said. Although foundrymen know that a slightly oxidizing atmosphere is desirable, most of them melt under a reducing atmosphere because it is faster, melting loss is lower, and burners are more easily adjusted, he explained. The zinc test for determining the melting atmosphere and a practical test for gas absorption were described.

If a cold piece of zinc is passed through the flame, Mr. Langsenkamp said, it comes out black if the furnace is highly reducing, straw yellow if slightly reducing, and clean if the atmosphere is oxidizing. To

Dr. Frank Sparks (left), president of Wabash College, chats with Dr. Frederick L. Hovde, president of Purdue University, as Paul H. Harlan, Electric Steel Castings Co., looks on at the Castings Conference banquet.

check gas pick-up, punch a 1½ in. diameter sprue cutter into the corner of a mold and fill the cavity with metal to be tested within ½ in. of the top. If the metal shrinks well in solidifying it is probably satisfactory. If the test specimen bulges on top the metal is gassed. The metal is highly oxidized if strings form on the pouring lip and black specks rise to the surface of the melt.

Mr. Langsenkamp suggested watching air-fuel ratios, condition of nozzles and combustion chambers, and the condition of refractories to conserve fuel.

Dr. G. M. Enos presided at the concluding session of the conference. Speaker was Ben G. Thiel, Waukesha Motor Co., Waukesha, Wis., who discussed casting purchasers' requirements.

The Metals Castings Conference concluded with a tour of several departments and buildings of Purdue University. Arrangements were made by members of Mu Tau Epsilon, local honorary metallurgical society, who also served as guides. Buildings and laboratories visited included the machine shop, the foundry, electrical engineering building, the physics building, laboratories for metallography and metallurgy, and the Purdue University Music Hall.

Schedule Five Technical Sessions For Birmingham Foundry Conference

Tentative plans for the Birmingham Regional Foundry Conference, scheduled for February 17-19, 1949, include five technical sessions, two mornings for plant visitations, a luncheon, an evening of entertainment, and a banquet. This was announced by Sam F. Carter, American Cast Iron Pipe Co., co-chairman of the Birmingham District Chapter Program Committee. General topics for the technical sessions are nodular graphite cast iron, sand at elevated temperatures, gating, time and motion study, and dielectric core baking.

Oldest Regional Foundry Conference, the three-day meeting in February will be the 17th annual gathering of Birmingham district foundrymen. This year's conference was attended by some 400 foundrymen.

To Hold Annual Wisconsin Regional Foundry Meeting February 10 And 11

Dates for the 12th Annual Wisconsin Regional Foundry Conference are February 10 and 11, 1949, Conference Committee Chairman A. C. Haack, Wauwatosa, Wis., has announced. To be held in Milwaukee again, the 1949 conference is expected to draw well over 600 foundrymen to make it the best-attended among the seven regional foundry conferences scheduled for the 1948-49 season.

Planning the Conference in addition to Mr. Haack are: Walter W. Edens, Badger Brass & Aluminum Foundry Co., Milwaukee, *co-chairman;* Professors G. J. Barker and E. R. Shorey, University of Wisconsin, Madison, *associate chairmen;* George E. Tisdale, Zenith Foundry Co., West Allis, Wis., *program chairman;* and Jos. G. Risney, Risney Foundry Equipment Co., Milwaukee, *program co-chairman.* Other committee members are: Leon Decker, Allis-Chalmers Mfg. Co.; E. C. Meagher, Chicago Retort & Firebrick Co.; Frank M. Jacobs, Standard Brass Works; D. M. Gerlinger, Walter Gerlinger, Inc.; Seward E. Shaver, Werner G. Smith Co.; Harold O. Boehm, Allis-Chalmers Mfg. Co.; Carl F. Haertel, The Falk Corp.; all of Milwaukee; and John J. Janes, Standard Foundry Co., Racine, Wis.

Public Speaking Course Again Part Of Detroit Educational Activities

Repetition of the popular public speaking course of last year is an important part of the Detroit Chapter educational plans for the 1948-49 season. Climaxing this year's educational activities will be a "Father and Son Night" May 20, 1949, at which the A.F.S. film *Hydraulics of Gating* will be shown. Dr. Ralph L. Lee, General Motors Corp., Detroit, will be the principal speaker. Each chapter member will be asked to bring his son of high school age or older, or a neighbor's boy. Also attending will be reporters and editors of city and high school papers.

Teachers and students interested in the foundry industry are scheduled to attend regular monthly meetings at the invitation of the Detroit Chapter, and also the special educational meetings.

A series of discussions of defective castings has been scheduled for April. At this special educational series, Harry E. Gravlin, Ford Motor Co., Dearborn, Mich., will display defective commercial castings and lead a group discussion of causes and remedies.

The Detroit Chapter last year sponsored two public speaking classes with a total enrollment of 70. Second phase of the 1947-48 educational program was a series of four two-hour lectures. Directed primarily at high school students, these meetings were each attended by more than 125 foundrymen and guests.

Members of the Detroit Chapter Educational Committee are: Jess Toth, H. W. Dietert Co., *chairman,* who also headed the committee last year; L. Carl Beers and A. S. Lundy, both of Claude B. Schneible Co.; and R. L. Price and W. R. Morron of Peninsular Grinding Wheel Co.

New A.F.S. Dues Structure

For financing a program of expanded service to the industry, the A.F.S. Board of Directors has approved the following revised dues structure, effective January 1, 1949.

Class of Membership	Current Rates	Dues on Jan. 1, 1949
SUSTAINING	$100.00 min.	$150.00 min.
For firms desiring to aid the Society's activities in more direct proportion to the benefits received.		
COMPANY	$50.00 annual	$65.00 annual
Separate Company membership required for each separate plant of any one organization.		
PERSONAL	$15.00 annual	$20.00 annual
For individuals not connected with Sustaining or Company member plants.		
Exception No. 1—Individuals connected with plants holding Company or Sustaining membership.	$8.00 annual	$10.00 annual
Exception No. 2—Individuals engaged solely in educational or domestic government work.	$8.00 annual	$10.00 annual
STUDENT OR APPRENTICE	$4.00 annual	$ 4.00 annual
Application for Student or Apprentice membership must be signed or verified by Instructor or Supervisor.		

A. F. S. RESEARCH BENEFITS ALL FOUNDRYMEN

FOUNDRY FUNDAMENTALS are the goals of the eight A.F.S.-sponsored research projects in operation in United States and Canadian technical institutions. Initiated largely after authorization of the general plan by the Board of Directors in July, 1946, the projects are under the direction of research committees of the several Society divisions.

To date results of the program include the 470-page HANDBOOK OF CUPOLA OPERATION, eight extensive reports on high temperature testing and properties of sands, and four detailed reports on heat transfer and solidification of molten metal in sand molds.

Results of the research work, which are available to all foundrymen, are expected to continue to advance the industry through development of improved and new foundry techniques. Reports on several of the projects are scheduled for the 1949 A.F.S. Annual Convention, May 2-5, in St. Louis.

Prior to Board approval of divisional research projects, the Society carried on several research activities. Oldest A.F.S. research project is the work on high temperature properties of steel molding sands carried on at Cornell University since 1936 under the Sand Division. Second to be established was the Cupola Research Project, formally proposed to the Board in July, 1939, and under the Gray Iron Division. As the result of a paper on foundry heat flow problems at the 1944 Annual Convention, the work now carried on under the Heat Transfer Committee was approved in July of that year.

Five Projects Added Recently

The research program has expanded rapidly in the past two years and now includes the following five additional projects: mechanics of molten metal flow in molds, sponsored by the Aluminum and Magnesium Division; a study of the fracture test as an indication of the quality of tin bronzes, Brass and Bronze Division; centrifugal casting of light alloys, Centrifugal Castings Committee of the Aluminum and Magnesium Division; best microstructure for selective hardening of pearlitic malleable iron, Malleable Division; and influence of mold conditions on development of hot tears in steel castings, Steel Division.

High Temperature Sands Studied

The current high temperature studies of sand are the outgrowth of a request by the Steel Division in 1936 for a detailed study of several sand mixtures. Research started in the fall at Cornell University.

Early work required the development of a gas-fired furnace, for achieving temperatures up to 2800 F, and the auxiliary equipment for control and testing. Initially, four silica sands with several types of binders and a natural sand were tested for compressive strength at various elevated temperatures. These tests and results of sudden heating, such as the face of a mold receives when molten metal suddenly pours over it, are reported in TRANSACTIONS OF A.F.A., volume 47, 1939, pages 805-830. Reports made annually (except 1940) since first test results were announced can be found in TRANSACTIONS for those years.

Sand research work sponsored by A.F.S. is progressing along three distinct lines: (1) A program of tests on hot compressive strength of sand mixtures with a view to establishing a tentative standard test procedure for hot compressive strength testing; (2) A fundamental study of the reactions which take place as molding sand is heated and cooled, and the effect of time on these reactions; (3) A critical study of expansion characteristics of molding sands.

While the work on the last two items is long range in nature, the work on a test procedure should lead to results sooner, and should give foundrymen a tool for making comparative studies.

Cooperating closely with the studies at Cornell are the groups which carry on work primarily on a foundry basis rather than a laboratory basis, the committees on high temperature properties of iron molding materials and on non-ferrous sands.

Long-Term Cupola Research Instigated

The popular HANDBOOK OF CUPOLA OPERATION, sold out less than two years after it was published, was the second phase of the three-phase long-term Cupola Research Project. Instigated in 1939 by a group of foundry equipment and supply firms, the project was authorized by the A.F.S. Board of Directors and set up so that all who wanted to participate, financially and through committee work, might take part. Pledges for financial support were obtained from 276 companies connected with the foundry industry.

First step was a comprehensive study of literature pertaining to cupola operation. This information was combined with data supplied by 128 metallurgists and cupola operators to make up the HANDBOOK. The third phase of the work is well under way, utilizing a full time research worker and involving cooperative work with Ford Motor Co., Dearborn, Mich., Battelle Memorial Institute, Columbus, Ohio, Canadian Bureau of Mines, Ottawa, Ont., and United States Bureau of Mines, Washington, D.C.

Publish Results of Cupola Research

AMERICAN FOUNDRYMAN has carried a series of authoritative, understandable articles on cupola operation which have developed during the year as part of the Cupola Research Project. These articles appear in the March, April, May, October and December issues and will continue to be published in 1949.

Conduct Heat Transfer Research

The fifth annual report on the heat transfer research will be made at the 53rd A.F.S. Annual Convention in St. Louis, May 2-5, 1949. Popularity and value of the Heat Transfer Project is indicated by the increased number hearing the convention report—from less than 50 to over 200—since the series started. The heat transfer study, carried out at Columbia University with auxiliary work at Battelle Memorial Institute, Aluminum Co., (Cleveland), and Naval Research Laboratory (Washington, D.C.), makes use of the university's heat and mass flow analyzer. With this equipment foundry heat flow conditions can be simulated by

using electricity and appropriate electrical circuits.

The auxiliary work provides basic information on sand conductivity and rate of skin formation in various casting alloys.

The Aluminum and Magnesium Division's project on fundamentals of metal flow started at Battelle Memorial Institute with a study of water flow in a lucite mold. Motion pictures of this work have been made. Centrifugal casting of light metals is reported to be proceeding satisfactorily. Major expense is being borne by the Canadian Bureau of Mines.

Convention to Hear Report on Fracture

A report on the fracture test investigation going on at the University of Michigan will be made at the 1949 convention. At the October 4 meeting of the Brass and Bronze Research Committee the group decided to change from a test bar of uniform section to a step bar, discussed melting at different temperatures, and decided to melt under four atmospheres—oxidizing, neutral, reducing, and the atmosphere of an induction furnace. Color photographs of test bar fractures form part of the record of test data.

Also conducted at Michigan is the work on the best microstructure for selective hardening of pearlitic malleable iron. Work of flame hardening at the school will be supplemented by flame and induction hardening in industrial firms. Specimens for the study have been provided by eight commercial foundries cooperating with the research committee.

Factors responsible for the development of hot tears in steel castings and a quantitative evaluation of their effect are being studied at Armour Research Foundation, Chicago. Involving the development of a pattern design capable of measuring susceptibility of a given steel to hot tearing, the study will eventually be directed toward the control of hot tearing.

Want Sands Causing Scabbing

HIGH TEMPERATURE PROPERTIES of sands which cause scabbing are under investigation by the A. F. S. Committee on Physical Properties of Iron Foundry Molding Materials at Elevated Temperatures.

Foundrymen who have sands causing scabbing are invited to send samples to the committee for study. Results of tests on their sands will be reported to those who supply samples. No publicity will be given to foundrymen who wish to remain anonymous.

A minimum sample of 100 lb is desired. Foundrymen who send samples should supply the committee with moisture content and all other green properties known for the sand at the time it causes scabbing.

Samples of sand causing scabbing should be sent to Prof. W. A. Spindler, Department of Metal Processing, University of Michigan, Ann Arbor, Mich. Sand samples received prior to January 17 will be investigated at the next meeting of the committee, January 17-19.

British Columbia Educational Course At Halfway Mark—Class Still Open

MORE POPULAR than last year's initial educational program, the 1948-49 lecture course of the British Columbia Chapter has attracted some 40 chapter members, apprentices, and a number of visitors. Anyone interested can still enroll for the last half of the course. Comprised of 11 lectures and a like number of demonstrations, the course started November 1 at the Experimental Foundry of the Vancouver Technical School. The course makes no attempt to develop melting and molding skill but stresses basic principles of foundry techniques. Fee for the course, which has five two-hour lectures and five-hour demonstrations to go, is $5.00 to A. F. S. members and $10.00 to non-members. Applicants for the last half of the course should contact L. P. Young, A-1 Steel & Iron Foundry, Ltd., Vancouver, B. C.

Resuming the course on January 10 after the Christmas holidays, the following classes will be conducted:

	LECTURE	DEMON-STRATION
Metal Shrinkage	Jan. 10	Jan. 12
Machine Molding	Jan. 17	Jan. 19
Core Making	Jan. 24	Jan. 26
Casting Defects and Causes	Jan. 31	Feb. 2

The molding demonstrations will conclude with a visit to Heaps Engineering Ltd., New Westminster, where machine molding will be explained.

The lecture and demonstration series started with two meetings on preparation of metals for casting. The first consisted of a lecture by Dean H. Goard, principal of the Vancouver Vocational School, and a demonstration of cupola operation by members of the British Columbia Research Council, Howard M. Brownrigg and William Holden. Lecturer at the non-ferrous session the second week was Karel Alston, General Metals Industries Ltd., while the demonstration was handled by British Columbia Chapter Chairman Thomas Cowden, William McPhail & Sons Ltd.

The next two sets of meetings were on preparation and testing of molding sand with the first on sands and binders and the second on designing sand for a job. Lectures were by Mr. Holden, demonstrations by Mr. Brownrigg.

Types and design of patterns from a foundryman's point of view were described by William Brown and F. Coltart, Maple Leaf Pattern Works. Practical demonstration of handling patterns in the mold was made by Fred Bay, retired, Herbert Heaton, Heaps Engineering Ltd., New Westminister, and Chapter Vice-Chairman, J. A. Dickson, Dickson Foundry Co.

First two of four pairs of meetings on molding were held on December 6 and 13 with the demonstrations on December 8 and 15. Lecturers for the series, which will be resumed January 10, are professor William M. Armstrong, University of British Columbia, and Messrs. Heaton and Bay. Mr. Bay and Professor Armstrong, along with Mr. Dickson and Samuel C. Stewart, Canadian Sumner Iron Works Ltd., are acting as the molding demonstrators.

Practical foundry foremen to be selected from among the senior members of the British Columbia Chapter will conduct the lectures and demonstrations on core making.

The final lecture, on casting defects and causes, will be handled by Professor Armstrong and Mr. Dickson. The demonstration will be conducted by Mr. Bay and J. Findley.

The course, expected to benefit greatly those who are attending, is under the direction of Professor Armstrong and Mr. Dickson. The Provincial Government Apprenticeship Board has endorsed the course and is underwriting the fee for all indentured apprentices in the Vancouver area.

This year's educational course of the British Columbia Chapter was advertised in the newspapers and by means of an attractive course outline and description. A new venture for the chapter, it is successful because it is fully supported by the cooperative effort of all chapter members. The instructors are not paid for their services.

Though not two years old, the British Columbia Chapter is among the leaders in foundry educational work and is expected to figure strongly in the 1949 A. F. S. Apprentice Contest. This contest is open to all apprentices taking a minimum three year organized course of training. Details can be obtained from American Foundrymen's Society, 222 West Adams St., Chicago 6, Ill., or from the nearest A. F. S. chapter.

Name St. Louis District Chapter Men To Plan 1949 A.F.S. Annual Convention

HOST TO THE 1949 A. F. S. ANNUAL CONVENTION, the St. Louis District Chapter has set up the committee structure for the four day round of meetings, May 2-5. Last held in St. Louis in 1943, the annual congress of the Society will again be west of the Mississippi for the second time in 53 years. A non-exhibit convention, the 1949 meeting will include technical sessions on every phase of foundry operation and practice, the popular round-table luncheon meetings, shop course sessions, and plant visitations.

Highlights of the 1949 A. F. S. Foundry Congress will be the Annual Meeting and the Annual Banquet. Speakers at the Annual Meeting are President W. B. Wallis, who is visiting each of the 46 A. F. S. chapters during 1948-49, and John Howe Hall, Swarthmore (Pa.) consultant, 1949 Charles Edgar Hoyt Annual Lecturer, who will discuss composite cast-weld construction. Feature of the Annual Banquet will be the awards of A.F.S. Gold Medals and Life Memberships.

Housing Applications Out Early in 1949

Housing application blanks for rooms during the 1949 A.F.S. Annual Convention will be mailed out shortly after the first of the year. All room reservations will be handled by the St. Louis Hotels Reservation Bureau.

Committee heads for the 1949 A. F. S. Foundry Congress announced by St. Louis District Chapter Chairman A. L. Hunt, National Bearing Div. of American Brake Shoe Co., are the following:

GENERAL ARRANGEMENTS COMMITTEE—C. R. Culling, Carondelet Foundry Co., *chairman;* E. J. Aubuchon, M. A. Bell Co., *co-chairman;* Paul E. Retzlaff, Busch-Sulzer Div., Nordberg Mfg. Co., *secretary,* and Henry W. Meyer, General Steel Castings Corp., *treasurer.*

RECEPTION COMMITTEE—Harry C. Sanders, American Foundry & Mfg. Co., *chairman;* George E. Mellow, Liberty Foundry Co., *vice-chairman.*

PUBLICITY COMMITTEE—Charles E. Rothweiler, Hickman, Williams & Co., *chairman;* Paul C. Schwarz, National Bearing Div., American Brake Shoe Co., *vice-chairman.*

PLANT VISITATION COMMITTEE—Luther Klebar, General Steel Castings Corp., *chairman;* Walter A. Zeis, Walter A. Zeis Co., *vice-chairman.*

BANQUET COMMITTEE—Robert E. Woods, M. W. Warren Coke Co., *chairman;* Ralph M. Hill, East St. Louis Castings Co., East St. Louis, Ill., *vice-chairman.*

SHOP COURSE COMMITTEE—Norman L. Peukert, Carondelet Foundry Co., *chairman;* Marshall Reichert, Banner Iron Works, *vice-chairman.*

LADIES ENTERTAINMENT COMMITTEE—Mrs. A. L. Hunt, *chairman;* Mrs. E. J. Aubuchon, *vice-chairman.*

Chapters Plan Local Competition For 1949 A.F.S. Apprentice Contest

PLANS FOR PARTICIPATION in the 1949 A. F. S. Apprentice Contest have been announced by two chapters and others are expected to report arrangements soon. The two chapters—Wisconsin and Northeastern Ohio—are regulars in the contest and have produced a number of winners. Now in its 26th year, the contest is open to indentured apprentices in any shop who meet entrance requirements.

United States entrants should apply, through their sponsors, to American Foundrymen's Society, 222 West Adams St., Chicago 6, Ill. To facilitate handling of patterns and castings through customs, Canadian entrants are requested to apply directly to G. Ewing Tait, Dominion Engineering Works Ltd., Box 220, Montreal, Que.

Competition is open in steel molding, gray iron molding, non-ferrous molding, and patternmaking with prizes of $100, $50, and $25 for the winners in each division. All winners receive a certificate of recognition, and in addition, the four first prize winners receive round trip rail and Pullman fare to enable them to attend the A.F.S. Annual Convention in St. Louis, May 2-5, 1949. A breakfast in honor of the winners, with A.F.S. Apprentice Contest Committee members as hosts will be held prior to awarding of prizes. Certificates and prizes will be presented by A.F.S. President W. B. Wallis at the Annual Meeting.

To enter the contest it is not necessary to be an A.F.S. member nor to be affiliated with a shop represented in the Society. Any apprentice taking a training course of not less than three years duration, who is not over 24 years of age on the day he competes in the contest, is eligible. Veterans of World War II are eligible if their age less their term of service is not over 24.

As in the past, many A.F.S. chapters will conduct local contests to select patterns and castings to be sent to St. Louis for final judging. Sponsors and entrants are urged to consult officials of the nearest A.F.S. chap-

ter to see whether a local contest will be held before entering directly in the national contest. Plants in areas where a chapter contest will not be held may conduct a plant contest to select entrants for the finals.

Blueprints for the pattern division of the contest, and patterns for the molding divisions, are furnished by A.F.S. This year, for the first time, patterns for the same castings will be used for all three molding divisions. Castings are expected to illustrate the different types of gating and risering used for various alloys.

Last day for entering the 1949 A.F.S. Apprentice Contest is March 15. Judging will take place in St. Louis early in April. All castings and patterns entered in the finals will be exhibited during the 1949 Annual Convention of A.F.S. in St. Louis, May 2-5.

Schedule Three Sand Shop Sessions For A.F.S. Annual Foundry Congress

MEETING IN DETROIT, November 22, the Sand Shop Course Committee made up its program for the 53rd A. F. S. Annual Foundry Congress to be held in St. Louis, May 2-5. Always well attended, the popular informal discussion sessions on foundry sand problems will be held in the evening to accommodate the greatest number of operating men.

The three sessions planned and the discussion subjects are: *steel,* "Penetration;" *gray iron and malleable iron,* "Resin Bonded vs. Oil Bonded Core Sands;" and *non-ferrous,* "Core Blowing."

Planning the sessions were Committee Chairman D. F. Sawtelle, Malleable Iron Fittings Co., Branford, Conn.; R. H. Jacoby, The Key Co., East St. Louis, Ill.; Frank S. Brewster, H. W. Dietert Co., Detroit; E. J. Bush, Navy Yard, Washington, D. C.; F. R. Mason, Riley Stoker Co., Detroit; E. L. Thomas, Cadillac Motor Co., Detroit; and J. E. Foster, American Foundrymen's Society Headquarters.

Need For Standards To Insure US Security Told At Annual ASA Meet

"WHAT GOOD ARE STANDARDS?", an introspective question asked by the American Standards Association as the keynote of its 30th Annual Meeting, held in New York City, October 20-22, was answered by some of the nation's leading industrialists and Government officials.

The Honorable W. John Kenney, Under Secretary of the Navy, spoke on the necessity for simplification and standardization if national security is to be guaranteed by an efficient and economical military supply system. As featured speaker at the Annual Meeting Luncheon terminating the three-day meeting, Mr. Kenney described the steps being taken by the Munitions Board to bring about coordination of standards of the Army, Navy and Air Forces, and to unify them with industry's specifications.

Two steps have been taken toward this goal, Mr. Kenney said. They are establishment of the Munitions Board's Catalog System, which provides a single name, description and identification number for each item used, thus eliminating about 50 per cent of the 5 million items involved; and the setting up of a Standards Agency, which will develop common designs of equipment or components. Specifications will no longer be published separately by the various military branches but will be coordinated as National Military Establishment (NME) specifications.

Other features of the three-day meeting were panel discussions led by Earl C. Shreve, president of the Chamber of Commerce of the United States; Willis S. MacLeod, deputy director of the Standards Branch, Bureau of Federal Supply, U. S. Treasury Department; G. C. MacDonald, Montgomery Ward & Co.; R. C. Sogge, General Electric Co.; and Harold L. Hoefman, vice-president of the Link Belt Co.

Mr. Hoefman declared that standards have been of immeasurable value to his company in promoting economy, efficiency, customer service, and in "bringing order out of disorder and chaos" in the industrial field. Mr. Hoefman cited such specific advantages as less machine time set up, standard operations, quality control, safety and cost reduction.

Officers for the coming year announced at the Meeting were: president, T. D. Jolly, vice-president in charge of Engineering and Purchases, Aluminum Company of America; and vice-president, Dr. Harold S. Osborne, chief engineer, American Telephone & Telegraph Co. Vice-Admiral G. F. Hussey, Jr. (USN, Ret.), was re-elected secretary of the Association; and Cyril Ainsworth was re-elected technical director and assistant secretary of the American Standards Association.

WANTED! BOUND VOLUMES OF TRANSACTIONS OF A.F.S.

Arrangements to sell your bound volumes of TRANSACTIONS OF A.F.S., intact and in good condition, can be made through A.F.S. headquarters. The following volumes are especially needed:

VOLUME	YEAR	VOLUME	YEAR
1	1896	22	1913
2	1897	26	1917
3	1897	31	1923
4	1898	33	1925
5	1898	38	1930
6	1899	39	1931
7	1899	40	1932
8	1900	41	1933
9	1901	42	1934
10	1902	43	1935
11	1902	44	1936
12	1903	45	1937
13	1904	46	1938
14	1905	47	1939
15	1906	48	1940
16	1907	49	1941
17	1908	50	1942
18	1909	52	1944

Those who have no further use for the bound volumes of TRANSACTIONS OF A.F.S. listed above, or any other volumes of TRANSACTIONS on their bookshelves, are requested to communicate with The Secretary, American Foundrymen's Society, 222 W. Adams St., Chicago 6, Ill.

ADEQUATE DUST CONTROL KEEPS FOUNDRY CLEAN

Allen D. Brandt
Industrial Hygiene Engineer
Bethlehem Steel Co.
Bethlehem, Penn.

During the past decade or two much thought, time and money have been expended on "cleaning up the foundry." This has been done not only by plant operating and engineering personnel but also by dust control equipment manufacturers, consulting engineers and institutions, and industrial hygiene personnel in insurance companies and official agencies, such as City, State and Federal Health and Labor Departments.

As a result of these combined efforts the foundry industry as a whole has come a long way, and the foundry no longer can be considered as a dark, dirty, dusty, dangerous place of employment. There are exceptions, of course, and the job of cleaning up is far from complete, but the industry and the American Foundrymen's Society deserve credit for the tremendous strides made in improving working conditions.

Before discussing the subject of this paper, let us recall some of the more important reasons which prompted dust elimination, since if we have clearly in mind the reasons why a job should be done we know better how to proceed than if we are groping in the dark. Probably the most compelling reason was the incidence of silicosis among foundry workers. There is little agreement among the rates reported by different investigators (references 1, 2, 3, 4, 5, 6, 7, 8), making the selection of a good average value out of the question.

The lack of agreement may be attributed to the different types of foundries studied, number and type of foundry workers included in the group, and procedure followed by the investigators. Very high incidences are reported by some investigators, but their studies covered selected employees rather than all employees in one or more foundries. The findings from all studies which covered all foundry workers and different foundries indicate silicosis to be present in less than 10 per cent of the workers. For 80 foundries in New York State, for example, the incidence was 2.7 per cent; an additional 4.5 per cent showing fibrosis[8]. These data show that while the silicosis rate in the foundry industry as a whole was not high enough to be alarming, it was high enough to justify immediate and concerted action.

The second compelling reason was the high rate of labor turnover and the difficulty, especially in times of prosperity, of keeping men on the job. This relationship existed to a certain extent between the foundry industry as a whole and other industry generally; more so from one foundry to another; and most of all from certain types of jobs to others in a foundry.

Instances are known, for example, where the foundries found it necessary to clean up in order to operate at all; they could not hire men fast enough nor keep them long enough to maintain an effective working force. To these reasons must be added the desire of most management to improve the working conditions in the plants under their jurisdiction. Without the cooperation and backing of foundry management, much of the effort of those actively engaged in this work would be wasted.

The subject of dust control is much too big to be covered in one paper. There are large and small foundries; iron, steel, brass, magnesium and other similar types of foundries; there are jobbing foundries and production or assembly line foundries; there are mechanized foundries and others that are operated almost entirely by hand; and many other classifications which indicate unique differences requiring special control equipment, if not, indeed, wholly different approaches to the dust control problem. This discussion, therefore, will be confined to those operations common to a number of foundries regardless of type. The methods, equipment, or principles outlined are applicable to the control of the dust at the multitude of operations or dust sources not common to many foundries.

Foundry processes may be divided into the following five groups which afford a convenient pattern to follow in discussing the dust problems and their control:

1. Preparation of molds and cores.
2. Melting and pouring of the metal.
3. Breaking out castings from the molds and removing core sand.
4. Cleaning the castings.
5. Reconditioning the molding sand.

Preparing Molds and Cores

Little dust is dispersed in making molds by hand from damp sand. Even if sandslingers are used for throwing the molding sand into the flasks, not much dust is dispersed if the sand is moist. Most of the dust found in hand-molding areas is chargeable to poor housekeeping which allows the accumulation of dry

This paper was presented at the All-Canadian Foundry Conference, Montreal, Quebec, Canada, Sept. 30-Oct. 1, 1948.

SAFETY AND HYGIENE CODES
Published by American Foundrymen's Society

FUNDAMENTALS OF DESIGN, CONSTRUCTION, OPERATION AND MAINTENANCE OF EXHAUST SYSTEMS.

RECOMMENDED PRACTICES FOR METAL CLEANING SANITATION.

RECOMMENDED GOOD SAFETY PRACTICES FOR THE PROTECTION OF WORKERS IN FOUNDRIES.

GRINDING, POLISHING AND BUFFING EQUIPMENT SANITATION.

RECOMMENDED PRACTICES FOR INDUSTRIAL HOUSEKEEPING AND SANITATION IN THE FOUNDRY.

dirt on the molding floor and on the flasks, patterns and equipment. Other important sources of dust in the molding area where moldmaking is a hand operation are the careless application of parting compound, blowing off dirt with compressed air, using a compressed-air-operated ejector to remove the dirt and sand from cavities and depressions, and sometimes nearby operations such as shakeout and cleaning.

In production plants molds are usually made on machines. Moist sand is supplied to the flasks from overhead hoppers or by other suitable means. Facing sand may be some of the overflow which is hand-screened for this purpose, or it may be new material delivered to the worker by truck or conveyor. The mold when finished is placed on a conveyor for transfer to the central pouring station. Molding in production plants is therefore carried on at a more rapid pace and in a more concentrated area than in nonmechanized or jobbing plants, with the result that the dust concentrations are usually higher in the production plant molding areas.

Dust Concentrations Surveyed

To be a little more specific on the dust concentrations one may expect at molding operations, let us consider briefly the findings of the survey conducted by the state of New York in 12 representative foundries in the state[9]. The results of this survey are summarized in Table 1. A glance at the table shows that of the 59 samples collected in the molding areas of the 12 plants, 26, or 44 per cent, fell in the 0-15 mppcf (millions of particles per cubic foot of air) group; 18, or 31 per cent, in the 15-30 mppcf group; and the remaining 15, or 25 per cent, in the group above 30 mppcf. A different breakdown of the results from the survey shows the median values for the molding areas of the different plants to vary from 1.4 to 60.5 mppcf, and the median value of these median concentrations to be 16.3 mppcf.

The most important dust control measure in the molding area is good housekeeping. The floor in general and the walkways in particular should be kept moist. The use of wetting agents in the water employed for this purpose is proving quite beneficial; the sand and dirt is wetted much more readily and deeper and it remains moist much longer. Keeping the patterns, flasks, bottom boards and molder tools clean and in an orderly arrangement are important good housekeeping measures.

Vacuum systems located centrally in the molding area should replace compressed air for cleaning dirt and loose sand from molds. Even a brush and pan can be substituted for much of the blowing with compressed air. The molding area should be segregated from other dustier operations. Parting compounds containing a maximum of 5 per cent of free silica are available in substantial number and should be substituted for all compounds having large percentages of free silica. In addition, the parting compounds should be applied without scattering and dusting.

For production molding in concentrated areas, local exhaust ventilation should be provided at the molding stations or benches. This is especially true where bumper molding machines are in operation. Either lateral draft away from the worker or downdraft may be used. The exhaust rate must be sufficient to create a capture velocity of about 200 fpm (feet per minute) at the point of, or in the area of, the dust source most remote from the hood for small molds, and not less than 100 fpm for large molds.

Coremaking, like moldmaking, is usually not a dusty operation if good housekeeping is maintained. In fact, less dust is found in corerooms than in moldmaking areas as a rule. Spraying silica wash on cores, however, may produce a serious dust hazard if uncontrolled. Rubbing and sanding cores, cutting cores with abrasive saws, and screening dried core sand are other sources of dust encountered in some coremaking departments. Reference to Table 1 will show that of the 15 dust concentrations measured in the corerooms of the 12 foundries studied in the New York State survey, ten, or 67 per cent, were in the 0-15 mppcf group; three, or 20 per cent, fell in the 15-30 mppcf group; and the remaining two, or 13 per cent, exceeded 30 mppcf.

As in moldmaking areas, the key to satisfactory dust control in the coreroom is largely good housekeeping. Dust from nearby or adjacent dusty areas should be prevented from entering the corerooms by segregation of the latter. If spraying silica wash is a routine and continuous operation, it should be done in an exhaust ventilated booth such as a spray-paint booth or over a downdraft grille.

Recommended ventilation rate for a spray booth used for this purpose is about 200 cfm (cubic feet per minute) per square foot of opening at the face of the hood, and with a downdraft grille it should be sufficient to produce a capture velocity of not less than 200 fpm at the point of spraying most remote from the grille. The dust from rubbing and sanding of cores should be removed by local exhaust hoods or downdraft grilles. For these operations a capture velocity

TABLE 1—SUMMARY OF DUST CONCENTRATIONS REPORTED FOR 12 FOUNDRIES IN NEW YORK STATE

Operation or Location	Number of measurements made	Dust concentrations Less Than 15 mppcf No.	per cent	Dust concentrations Between 15 and 30 mppcf No.	per cent	Dust concentrations Over 30 mppcf No.	per cent
Molding	59	26	44	18	31	15	25
Corerooms	15	10	67	3	20	2	13
Shakeout	33	13	39	4	12	16	49
Core Knockout	6	2	33	3	50	1	17
Casting Cleaning	26	17	65	8	31	1	4
Sand Conditioning	12	3	25	5	42	4	33

ranging from about 150 fpm to about 500 fpm is required over the area of dust escape most remote from the hood or grille, depending upon the disturbance created by the operation.

Local exhaust ventilation at abrasive saws is essential. This may be accomplished by installing or forming a hood or baffled area in the line of throw from the saw and exhausting air at a rate not less than 400 cfm, or by performing this operation in a partial enclosure similar to a spray-paint booth ventilated at a rate of not less than 150 fpm per square foot of face opening; the operator to be located upwind from the saw. A satisfactory arrangement is shown in Fig. 1. Screening dried core sand, also the drying of it, should be done in isolated areas, or better, in booths exhaust ventilated at the rate of about 100 to 150 fpm per square foot of face opening.

Although only dust is mentioned in the title of this paper, other types of atmospheric contaminants which are common to most foundries will be discussed also. Core ovens, for example, produce unpleasant gases and smoke. Adequate exhaust ventilation of the ovens or of the areas in which they are located is neccessary to prevent the escape of gases and smoke into the coreroom. The make-up air for these exhaust systems may be drawn from the dustier areas of the foundry and introduce an unnecessary dust exposure in the coremaking area if it is not properly isolated, and if ready access is not provided for make-up air directly from the outside or from some adjacent room or area where the air is not contaminated significantly.

Melting and Pouring

Melting and pouring of the metal being cast do not generate significant quantities of dust in themselves. However, the heat released by the molten metal as it is being conveyed to pouring locations and poured dries the sand and dirt on the floor, and the increased activity frequently associated with this work stirs up considerable dust which is dispersed by the greatly increased air movement. Objectionable quantities of unpleasant and irritating gases and smoke may be generated during melting and pouring of the metal. Metal fumes, some of which may be toxic in nature, also escape into the workroom air during these operations.

Excessive atmospheric contamination from the melting and pouring operations can be prevented by one or more of the following procedures, depending upon the circumstances:

1. Proper wetting of floors with water containing a suitable wetting agent.
2. Good general ventilation in the pouring area, especially in small or jobbing foundries where pouring is done over a large area and only periodically such as near the close of the shift.
3. Local exhaust ventilation at one or more central pouring stations in production plants.
4. Careful temperature control on furnaces or melting pots used for toxic metals.
5. Hoods and local exhaust systems at melting pots and furnaces.

If water only is used to moisten the floor sand in the pouring area, good penetration is difficult to accomplish; the water evaporates rapidly, and there is danger from spattering of metal in the event of spillage in an abnormally moist spot or in a small pool of water. The addition of a wetting agent to the water results in rapid wetting and penetration of the floor sand, much slower drying, and much less possibility that any of the sand near the surface will be wet enough to cause spattering of metal.

Good general ventilation in the pouring area of small or jobbing foundries will prevent the accumulation of high concentrations of dust, fumes or gases even though the exposure of the ladle men to fumes may be greater than desirable for short periods if toxic metals are being cast. In production foundries, the pouring should be done at prescribed locations which are equipped with hoods and exhaust systems. The usual procedure is to enclose the back of the conveyor on which the molds travel, and the top if practicable,

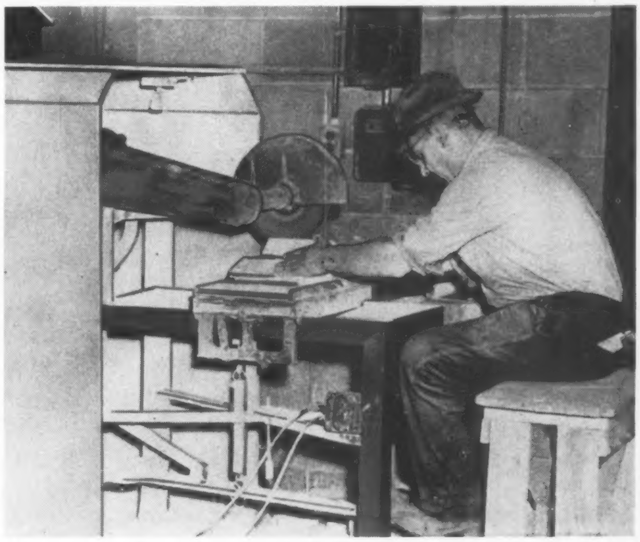


Fig. 1—Photograph showing a booth-type enclosure for controlling dust created by a masonry or ceramic saw.

in the area of the pouring station to form a hood through which air is exhausted at a rate sufficient to maintain a velocity of about 100 to 200 fpm through the front opening.

The conveyor immediately following the pouring station also should be enclosed and provided with exhaust ventilation for as long a distance as is necessary to prevent contaminating the foundry atmosphere with irritating gases and fumes. A low exhaust rate will suffice in this enclosure; it need be only enough to prevent the escape of the gases and fumes from the newly poured molds.

Furnaces or melting pots like those in most nonferrous foundries and the electric furnace for steel release smoke, fumes and gases in such quantities as to require hooding and local exhaust ventilation. The high overhead or canopy type of hood or roof exhausters are frequently not satisfactory. Each hood should be tailored to fit on or as close to the furnace as practicable.

Even tilting furnaces often can be fitted with hoods which enclose them almost completely, as shown in Fig. 2. If this is done, relatively small exhaust rates

Fig. 2—Partially-enclosing hoods have been fitted to the tilting furnaces shown at the left of photograph.

will suffice for furnaces which would otherwise require two to ten times as much air flow to accomplish a satisfactory job of control. Proper exhaust rates cannot be recommended for melting furnaces because they are governed so completely by the fit of the hood, the size and type of the furnace, and the nature of the materials melted.

Two miscellaneous operations associated with melting and pouring produce dust exposures that merit mention. These are abrasive cutting wheels for shaping or sizing refractory brick to be used in foundry furnaces, ovens and ladles, and ladle cleaning, repairing and relining. Dust at the abrasive saw should be controlled as described for similar saws used for cutting cores.

Dust produced in connection with ladle maintenance can be controlled by exhausting air from the ladles through a flexible hose, which terminates inside and near the bottom, whenever the workman is inside the ladle. The amount of air that should be exhausted depends upon the size of the ladle, but should be about 200 cfm per square foot of opening at the top of the ladle. If work of this nature is infrequent and of short duration, the man doing it can be protected by wearing a mechanical-filter respirator of a type approved by the Bureau of Mines.

Shakeout and Core Knockout

Shaking out castings and removing core sand are important sources of dust dispersion. The amount of dust dispersed will vary tremendously, depending upon a number of factors. Among these are: (1) temperature of the casting; (2) dryness of the molding sand; (3) ratio of metal to sand; (4) shakeout and core sand removal methods employed, and (5) care taken in handling castings, dusty flasks and bottom boards.

From Table 1 it may be seen that of the 33 dust concentration measurements made at shakeout operations in the New York State survey, 13, or 39 per cent, were found to be less than 15 mppcf; four, or 12 per cent, were found to be between 15 and 30 mppcf; and the remaining 16, or 49 per cent, exceeded 30 mppcf. From the data shown in the report it may be determined that the median concentration of the median values for all 12 foundries is 18.9 mppcf. This figure does not compare too unfavorably with the 16.3 mppcf given earlier for the molding areas.

Core knockouts may produce even greater variations in dustiness than shakeouts. Breaking out soft core sand by hand with a bar and hydraulic blasting, of course, disperse very little dust, while pneumatic chipping on large, irregularly shaped castings disperses enormous amounts. Only six measurements of dust concentrations at core knockout operations were made in the New York State study. From Table 1 it may be seen that two of these concentrations, or 33 per cent, were below 15 mppcf; three, or 50 per cent, were between 15 and 30 mppcf; and the remaining one, which constituted 17 per cent of the total, exceeded 30 mppcf.

Fig. 3—Positive dust control is effected at a shakeout by means of an exhaust-ventilated enclosing hood.

Shakeout and core knockout operations in particular should be segregated from less dusty operations such as molding, coremaking, pouring and melting in order that the dust created by them be prevented from making those other operations hazardous to health. Even if the shakeout is operated on an off-shift, much unsuspected dust may be added inadvertently to the adjacent molding area during the working shift by jarring loose some of the dust that had accumulated on the rafters and other surfaces of the molding area during the shakeout period.

Dust control measures for shakeout operations differ with the shakeout procedure, depending upon whether the work is done by hand or mechanical means, and whether or not it is done at central or localized locations. In the jobbing, and possibly even the semiproduction foundry, the molds are stored over a large floor area until they are poured in a group.

Shakeout under these circumstances does not permit the application of local exhaust ventilation. Dust control can be accomplished by (1) allowing the castings to cool as much as possible before shakeout; (2) wetting down the floor and molds before shakeout and the mold sand immediately afterward; and (3) handling castings, bottom boards and flasks carefully. In addition, if this work is done during an off-shift, fewer men will be exposed to the dust dispersed.

Good general ventilation is necessary in the shakeout area, not only to keep the dust at a minimum but also to dilute the irritating gases and smoke to an unobjectionable level. Large roof fans which are operated only during the shakeout period are of great help in this respect. Even if the foregoing measures are taken, it is sometimes necessary for the men engaged in shakeout operations to wear appropriate respirators.

In contrast to general or scattered shakeout operations, dust control in the mechanized or production foundry can be accomplished very effectively as a rule by local exhaust ventilation. A thorough discussion of ventilating shakeout operations would require more time and space than is permissible here. Therefore, the subject will be covered only briefly; reference should be made to other articles for details[10]. The central shakeout table is in common use in mechanized foundries. Whether the molds reach the shakeout table by conveyor, crane, or other means is not important except as it affects hood design.

To keep the required exhaust rate at a minimum and still accomplish good control, the shakeout table should be enclosed as completely as possible. Typical installations are shown in Figs. 3, 4 and 5. The common types of hoods in use are termed overhead hoods and side hoods. Downdraft and complete enclosures have been attempted without much success. Downdraft fails largely because the air flow is least when it is needed most because the sand and the casting cover some of the grille just as the mold breaks, and complete enclosures are frequently impracticable because of changes in mold and casting sizes and shapes.

Although the dust from large shakeout tables can be captured effectively by the use of simple side hoods, side shields attached to the hoods reduce substantially the required ventilation rate for adequate dust control. The time and effort spent by the hood designer and the foundry operating heads on developing an operating procedure that will permit the use of side shields will be repaid many times over in lower operating cost and improved dust control. The usual exhaust rates for hoods at shakeout tables range from 200 to 400 cfm per square foot of shakeout grille, depending on how nearly the hood encloses the table.

As with shakeout operations, removing core sand presents dust control problems which vary tremendously from foundry to foundry. The problems as well as the control measures are not unlike those associated with the shakeout. If the removal of core sand is not difficult and is accomplished by hand, such as the use of an iron bar or knocking the castings together, dust control can be effected by doing this work in a central exhaust ventilated booth similar to a spray-paint booth. An exhaust rate of about 150 cfm per square foot of booth opening will be adequate.

For cores which are difficult to remove, pneumatic chipping, blowing with compressed air, or blasting with water or a mixture of water and sand is required. These operations (with the exception of hydraulic blasting) should be done in an exhaust ventilated chamber or room similar to sandblasting rooms. Air at the rate of about 80 cfm per square foot of horizontal cross-sectional area should be moved through the room, which should be kept under a small negative pressure at all times to prevent the escape of dust. These conditions merely prevent the escape of dust from the chamber or room; they do not protect the worker in the room. Such workers require supplied-air respirators or helmets for adequate protection.

Cleaning castings by chipping, blasting, grinding, tumbling, brushing, and burning produces much dust.

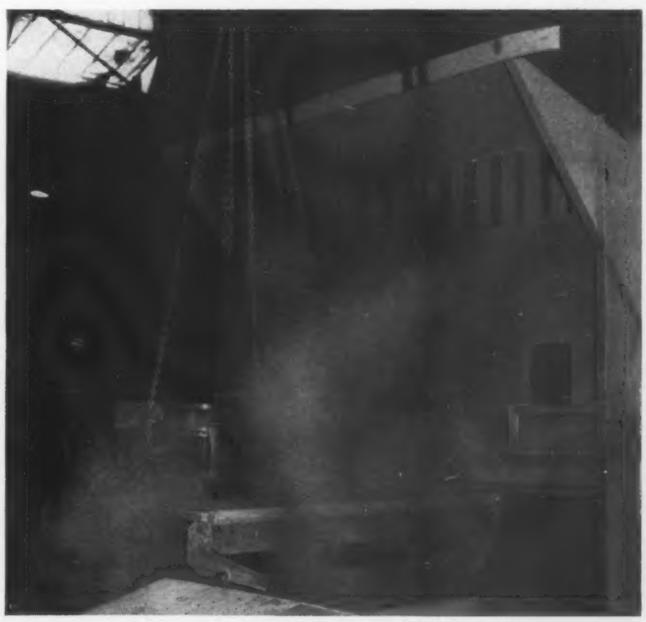


Fig. 4 (left)—A sidedraft hood installation provides positive control of dust at a central shakeout station.

Fig. 5 (above)—Effective dust control at a large shakeout operation is obtained by means of a sidedraft hood.

Most of these operations, however, lend themselves very well to dust control by local exhaust ventilation. In fact, dust control in the cleaning room of most foundries is much more common and effective than in other departments of the foundry. Consequently, dust concentrations at casting cleaning operations in the run-of-mine foundry are usually low, notwithstanding the fact that these operations are potent sources of dust production and dispersion.

This is evidenced, for example, by the results reported in Table 1. Of the 26 dust concentrations determined in ten different foundries, 17, or 65 per cent, were less than 15 mppcf; eight, or 31 per cent, were between 15 and 30 mppcf; and only one, or 4 per cent, was above 30 mppcf. Further analysis of the data given in the report of the New York State study shows the median dust concentration of the median values for all plants to be 13.3 mppcf. This is lower than the similar values given earlier for the shakeout and molding operations.

Details on hood or enclosure design and on required exhaust rates for stationary grinding wheels, tumbling barrels, and blast cleaning equipment such as rotating tables, cabinets and rooms have been presented several times elsewhere[11,12], and will not be repeated here. Dust from portable grinders and brushes should be controlled by downdraft or sidedraft, preferably in booths or partial enclosures, as shown in Figs. 6 and 7. The required ventilation rates vary with the nature of the hood but, in general, are such as to produce a capture velocity of not less than 250 fpm in the grinding area.

Good general ventilation is adequate if only a few portable grinders are used and if the castings are free from sand. Swing-frame grinders should be provided with booth-type hoods which partially enclose the frames of the grinding equipment. The required rate of air flow depends on several circumstances, but for an arrangement such as shown in Fig. 8 an inward air flow of 150 to 200 fpm into the hood opening directly behind the grinding wheel produces good ventilation results.

Probably the most difficult problem of dust control in certain foundries is that associated with pneumatic chipping of sand which adheres to the castings, especially large and irregularly shaped steel castings. Local exhaust by means of movable hoods has not proven practicable. Hydraulic blasting with sand and water is being used with some success for such cleaning jobs (Fig. 9). Even shot blasting can replace some of the pneumatic chipping being done. While these procedures do not eliminate the dust problem *per se,* they must of necessity be done in chambers or rooms which prevent escape of the dust. The workers who operate the blasting equipment must be protected by suitable respiratory protective devices if stationed inside the cleaning room.

Burning off excess metal from castings seldom is done to such an extent as to introduce a dust, smoke or gas control problem except for the burner. Good general ventilation will solve this problem as a rule, but if it is a continuous operation it should be done in an exhaust hood similar to a spray booth which is ventilated at a rate of about 100 cfm per square foot of opening into the booth.

Careless handling of castings while charging the tumblers or while grinding will produce considerable unnecessary dust. A word is in order regarding general ventilation in the casting cleaning room. Since most of the operations are usually provided with local exhaust ventilation and the exhausted air is not re-

Fig. 6—Downdraft-type grinding booths provide dust control. The hood is an integral part of the collector.

circulated, the required make-up air is adequate to accomplish good ventilation in cleaning operations.

Distribution of the make-up air may not be satisfactory, however, and if the make-up air is drawn from adjoining foundry departments, the air entering the cleaning room may be contaminated excessively before it enters. This condition can be avoided by enclosing the cleaning room and drawing the air from some room or shop where there is little atmospheric contamination, or by supplying outside air, which must be tempered in cold weather.

Sand Conditioning

Dust produced by sand conditioning in foundries varies from almost none in the small foundry, where the used sand is moistened and cut over by hand, to large amounts in those foundries where sand conditioning is almost wholly mechanized and the used sand must be handled considerably before its moisture content can be increased. Even with mechanized handling little dust is produced if the sand is damp. Sand conditioning equipment that must be considered in the dust control program includes screens, conveyors, mullers, riddles, elevators, magnetic separators.

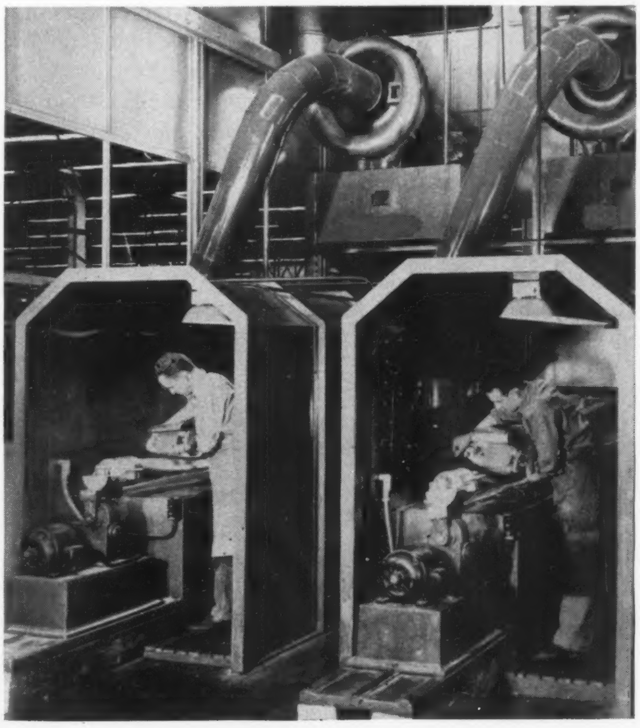


Fig. 7—Booth-type exhaust enclosures for controlling the dust created by belt-sanding of propellor blades.

The amount of dust produced by sand conditioning equipment is influenced largely by whether the sand is handled dry or moist, and whether or not control measures are in use. From Table 1 it will be seen that the concentrations found in the New York study were quite high. Of the 12 measurements made, three concentrations, or 25 per cent, were found to be less than 15 mppcf; five, or 42 per cent, were between 15 and 30 mppcf; and the other four concentrations, or 33 per cent, exceeded 30 mppcf. The data in the report show that the median concentratiton of the me-

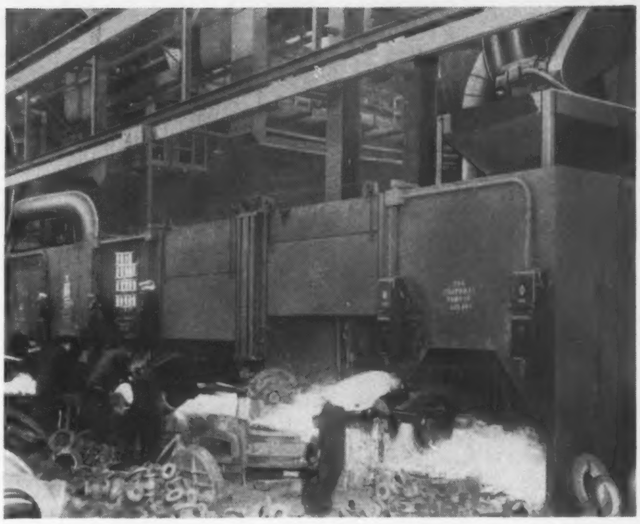


Fig. 8—A battery of exhaust-ventilated booths controls the dust produced in swing-frame grinding operations.

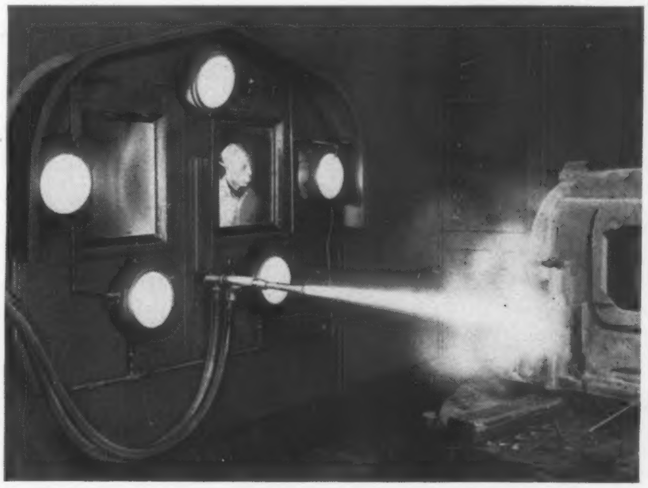


Fig. 9—Hydraulic blasting method of cleaning large castings of adhering sand prevents escape of much dust.

dian values for the seven plants in which sand conditioning operations were investigated was 27.2 mppcf. The comparable concentrations for the molding area, shakeout and cleaning room were only 16.3, 18.9 and 13.3, respectively.

Dust control at sand conditioning is a relatively simple and straightforward procedure. Electric riddles, except when used only infrequently, should be housed in booths similar to spray-paint booths which are ventilated at about 100 cfm per square foot of opening into the booth. If other unit or portable conditioning equipment is used, the sand should be moistened properly before it is processed, and in some instances respirators are needed by the men who operate this equipment.

Mullers, screens, transfer points at belt conveyors, elevators and magnetic separators should be hooded or enclosed and ventilated at rates summarized in Table 2. Figure 10 shows a diagram of a complete sand conditioning system with hoods as required.

The foregoing related almost entirely to specific conditions and control measures. There are a few

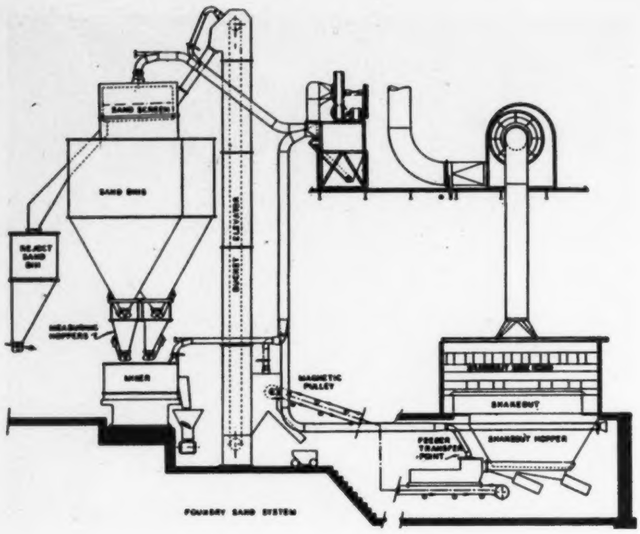


Fig. 10—Diagrammatic sketch showing a complete sand-conditioning system with dust control hoods as needed.

important fundamental considerations which apply almost equally to all foundries. These are (1) building construction and plant layout, (2) general ventilation, and (3) housekeeping.

Building construction, especially the layout or arrangement of departments and equipment, is of primary concern in dust control. Generally, little can be accomplished in this direction in existing foundries. New foundries, on the other hand, should be so laid out that there is a smooth or natural flow of materials.

Mechanization is important not only because it increases efficiency in production, but because it also makes possible more specific and positive dust removal. In one case an existing small brass foundry was rearranged and mechanized at what management felt was terrific cost. New cases of lead poisoning did not occur, whereas they had not been uncommon before the changeover. In addition, and to the pleasant surprise of management, production per man more than doubled and the percentage of rejects dropped almost one half.

Walls should be smooth and painted in light colors. Projections, exposed beams, etc., should be kept to a minimum so that there are fewer places for dust to collect and from which it must be removed routinely lest it be jarred loose. Good illumination aids

TABLE 2—MINIMUM VENTILATION RATES FOR HOODS AT SAND CONDITIONING EQUIPMENT

Equipment	Exhaust Requirement
Transfer Points	350 cfm per foot of belt width but not less than 150 fpm indraft.
Bucket Elevators	Exhaust from elevator head 100 cfm per sq ft of casing cross section.
Sand Screens	Flat deck—50 cfm per sq ft of screen area but not less than 200 fpm indraft.
	Cylindrical—100 cfm per sq ft of screen cross section. Volume may be doubled to provide required fines removal.
Sand Mullers	150 fpm through openings in dust hood.
Sand Bins	150 fpm indraft but not less than 0.5 cfm per cu ft of bin capacity.

in speeding production and in housekeeping. The size of the foundry in relation to its production rate has a profound influence on the dustiness because the atmospheric dust concentrations decrease as the crowding decreases.

Good general ventilation is important because all foundries have many minor and scattered dust sources. Even if the main dust sources are controlled effectively by means of local exhaust and other specific measures, good general ventilation is needed to prevent the general dust level from rising to undesirable levels.

A rule of thumb method for deciding upon minimum general ventilation required is 20 air changes per hour for mechanized foundries, and 12 air changes per hour for plants that are not mechanized. When applying this rule, it must be remembered that the general ventilation required varies considerably from plant to plant. In some instances these suggested rates will be inadequate, especially if the other and more specific control measures are lacking.

Before the dust measurements had been made, all foundries studied were classified into three groups as regards the housekeeping in evidence. For the purpose of this classification housekeeping only was considered. The approximate average dust concentrations for the molding areas, the shakeout operations, and the cleaning departments (the three departments for which dust concentrations are reported in each housekeeping class) were 7 mppcf for the good housekeeping group; 25 mppcf for the average group; and 32 mppcf for the group classified as poor.

Acknowledgments

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References

1. W. Landau, "Pulmonary Disease Among Cleaners of Castings Due to Dust," *Arch. f. Gewerbpath. u. Gewerbehyg., 3,* 412, 1932. Abstr. *Bull. Hyg. 8,* 26, 1933.

2. W. Landau, "Silicosis Among Casting Cleaners," *Arch. f. Gewerbepath. u. Gewerbehyg., 4,* 515, 1933. Abstr. *Bull. Hyg. 8,* 727, 1933.

3. W. J. McConnell and J. W. Fehnel, "Health Hazards in the Foundry Industry," *J. Ind. Hyg. 16,* 227, 1934.

4. F. M. Warfield, "Results of X-ray Chest Examinations Among 2,500 Workers in a Heavy Industry Plant," *Ind. Med., 4,* 302, 1935. Abstr. *J. Ind. Hyg., 17,* 104, 1935.

5. J. F. Kelly and R. C. Hall, "Silicosis in Modern Foundries," *New York State J. of Med., 37,* 1, 1937.

6. L. H. Osmond, "Dust Hazard Among Foundrymen," *Am. J. Roent., 38,* 122, 1937.

7. O. A. Sander, "The Lung Findings in Foundry Workers. A Four Year Survey." Paper read before Ind. Hyg. Section A. P. H. A. at 66th Annual Meeting, New York, Oct. 7, 1937.

8. "Silicosis in the Foundry Industry," New York State Dep't. of Labor, *Special Bulletin No. 197.* State Office Building, Albany, 1938.

9. T. Hatch, C. E. Williams and B. G. Dolin, "Dust Concentrations in Foundries," *The Industrial Bulletin, 18,* 89, (Feb.) 1939. Issued by New York State Labor Dep't., Albany, N. Y.

10. J. M. Kane, "Foundry Ventilation," *The Foundry,* Feb. and Mar., 1946.

11. "Silicosis Prevention—Dust Control in Foundries," United States Dep't. of Labor, Div. of Labor Standards, 1940 (for sale by Sup't. of Documents, Washington, D. C.).

12. Allen D. Brandt, "Industrial Health Engineering," John Wiley and Sons, Inc., New York, 1947.

QUALITY CONTROL METHODS BROUGHT DOWN TO EARTH

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LIKE EVERYONE IN INDUSTRY the foundryman is anxious to increase his production of material of better and better quality, and at a lower cost. Increased production in a foundry can come from faster and better molding, better scheduling, less wastage of metals, fewer defective castings and better handling. Finding the causes of trouble such as gas holes, "kish" or soft spots, hard castings, low tensile strength or off-analyses, and then doing something about the causes, makes for better quality. Better production, higher quality, a more uniform, stable and predictable foundry practice, decreased need for inspection, and less wastage means lower unit cost. The methods discussed in this paper can help the foundryman in all of these problems.

Performance varies from day to day. Every hour, or even every minute, the sand conditions vary, molding performance varies, atmospheric conditions change, and the metal being poured is not uniform. No two tensile tests from the same stack will be identical. The analyses will vary from one test to another. This continual variation in performance is what makes the foundryman's job so difficult. Are the boys lying down on the job, or is this just a perfectly natural chance variation toward lower quality? Actually the men are following exactly the same procedure as when quality seemed better.

Statistical Data Used as Foundry Tool

Varying results are, in essence, statistical data. Whether we like it or not, a series of varying results or measurements are statistical data. The foundryman is continually facing these varying numbers, and he must make decisions from them. Hence, he is dealing with statistical data. Just as surely as night follows day, he needs statistical tools to analyze such results and to make sound decisions. He would not expect to use a thermometer to find the thickness of a casting. He would use a gage designed for the job. In just the same way he should use a tool designed for varying data, namely, statistical quality control.

Why does the foundryman need statistical methods? There are two primary reasons for the use of statistical quality control. In the first place, there are two common types of errors which can be made when examining a string of "data." We can decide to take some definite action such as changing the pouring temperature or making some alloy addition, when in reality we are not justified from the evidence at hand in taking any action. We may, in fact, be taking a step in the wrong direction. On the other hand, we may look over the data and completely miss something on which action should be taken.

The writer knows of a case in steelmaking where nearly 50 pairs of heats were made following the standard practice and a proposed new practice before a decision was reached in favor of the latter. There was ample evidence after just ten heats to justify a change with a high degree of confidence. By not knowing statistics, the management lost about 2 per cent of yield on each of the 40 heats, done according to standard practice, while reaching a decision. (Two per cent of forty 200-ton heats is 160 tons of steel lost, on this one open hearth, and not counting the increased yield that would have resulted in other open hearths as well.)

Control Charts Show Quality Trends

Statistical quality control can reduce the chances of making a wrong decision. If the risks appear to be too great, more information can be gathered. The second fundamental reason for using statistical quality control is that the control chart, correlation and other tools are excellent fact finders, trouble shooters, and a great help in finding why things go sour. They picture the problem.

The control chart is an easily learned, adaptable and powerful tool. Some foremen with little technical and mathematical background have begun to use a control chart successfully after only 6 hours of instruction. Men and women all over the country have made a success of statistical quality control after an 8- or 10-day intensive course in the subject. Most of these were industrial people whose mathematics were 10 to 20 years behind them.

What is a control chart? Consider the graphs shown in Fig. 1. These are what may be called running record graphs. On each there is a quality measure plotted vertically, while horizontally are the different samples, open hearths or days. In graph A the characteristic is tensile strength of castings, and each point represents the average of five separate tests. Thus the first is 65,000 psi for the sum of the five tests divided by five.

Presented at the Metals Casting Conference, at Purdue University, Lafayette, Ind., Nov. 4, 1948.

Chart B shows a different characteristic of data, namely, variability. Each point represents the "range" for a set of four carbon analyses, that is, this is the difference between the smallest and the greatest carbon analyses within the four. For example, for open-hearth No. 1 on Feb. 3, there was a difference between the smallest and largest carbon analysis of 0.19 per cent, while for No. 7 on Feb. 5 the four heats must have been quite consistent because the difference between high and low carbon analysis was only 0.04 per cent.

Chart C in Fig. 1 shows the percentage of failure of electrical pieces each day for a month, on test "D". These could just as easily be defective castings or absenteeism.

Each of the three charts show considerable variation from one sample to another, for the particular quality characteristic that chart is picturing. It is apparent that some of this variation is perfectly natural and only what should be expected from the respective processes. But, it is wondered, are the more extreme points just "natural" or should some action be taken. The reader should take a careful look at all three graphs and choose the one which seems to show the best "control." Which chart has a pattern that most closely approaches a perfectly natural chance pattern of variation? Most people who have been asked the same question regard C as best, B next best, and A as the poorest control.

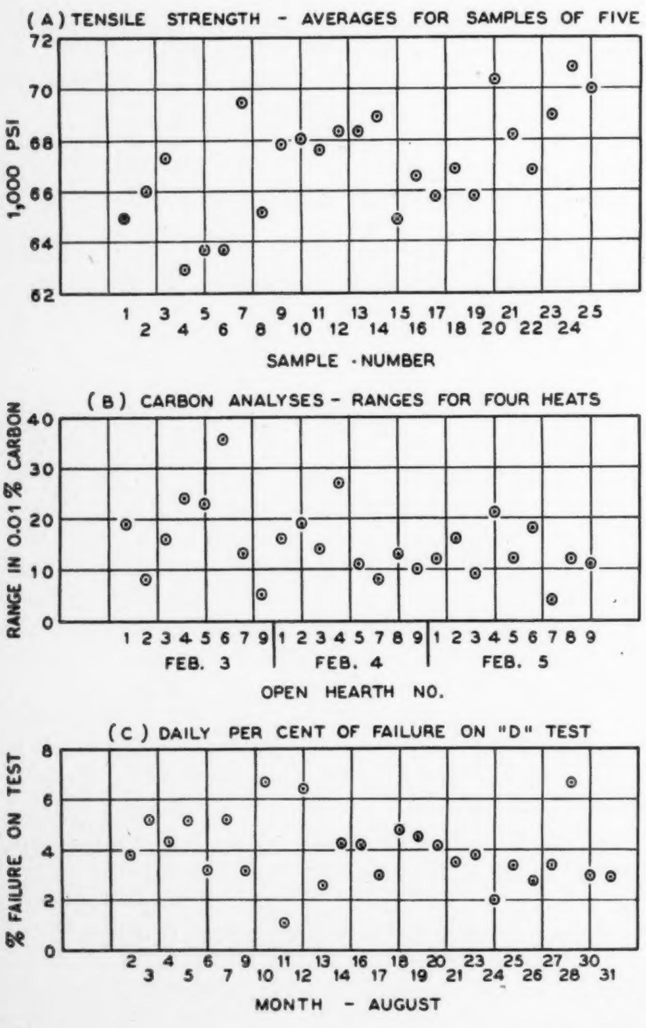


Fig. 1—Three running record charts for quality control.

Before answering this question, let us first have a look at Fig. 2. Which of these two running records of average edge-width dimension shows better control? Most people vote for B and few for A. The answer is that both charts are the same data plotted to a different scale. If the decision is influenced by the choice of scale which happened to be used in plotting the graph, then our judgment is not resting on a firm foundation.

Now look at Fig. 3. These points are exactly the same as shown in Fig. 1, but on each graph there are a center line and control limit lines. These lines are easily calculated in each case. The solid center line shows what is "usual" performance and is especially useful when trends appear. The control limit lines are dotted in. These serve to distinguish what is ordinary or to-be-expected variation from the center line, and that variation which is so exceptional that some action should be taken. Figure 3A shows the best control. The

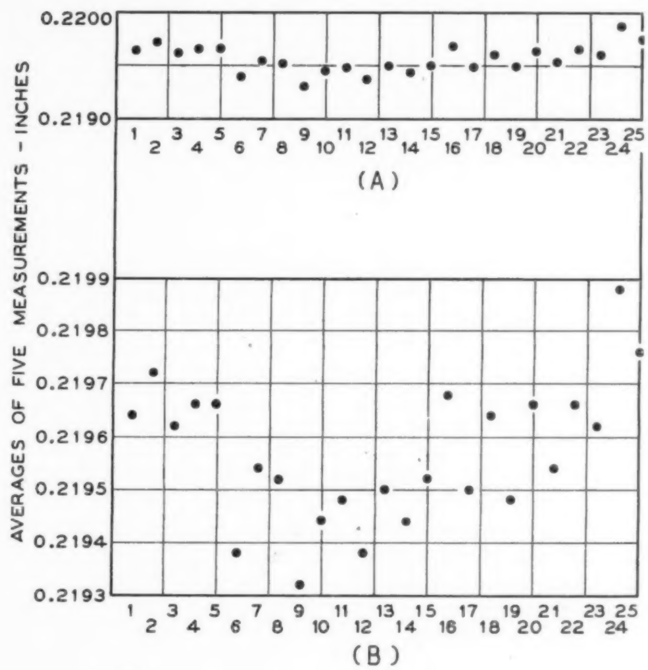


Fig. 2—Piston ring edge-width charts—first grind. Both charts have the same data plotted to a different scale.

apparent trend is not trustworthy; it can readily be just an "optical illusion." There is insufficient evidence to permit a safe decision that the foundry practice has made any real change throughout this period. There may have been a change, but it cannot be shown with anything like certainty. Such a process can be let alone.

Next note Fig. 3B. Open hearth No. 6 shows an excessive range (too much variation from heat to heat) in carbon readings. There is more than chance alone here. Some individuals would have singled out this point, because it is highest, and would have taken action. (Note that open hearth No. 6 was off the second day.) But without the control limit the question would also arise as to whether No. 4 on Feb. 4 was excessively high, and that something should be done. The control chart says, "Don't bother."

Figure 3C shows lack of control on a number of points. There are three which lie above the upper

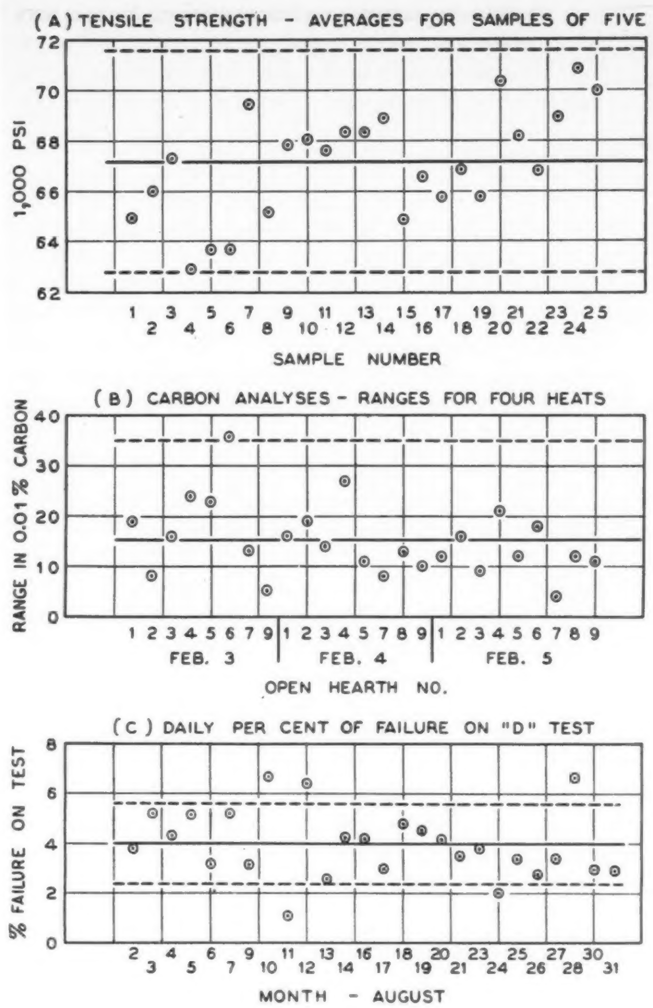


Fig. 3—Running record charts with same points shown in Fig. 1 but with center lines and control limit lines.

control limit and are, therefore, an indication of something in the process which should be sought out and elim.nated. Comparison with conditions the day before and after should help in learning what happened. On the other hand, Aug. 11 and 24 should be studied to find a cause for such exceptionally good performance. This is evidence that something was present which should be sought out and, if found, incorporated in the process. Often such "good" points are neglected and opportunities for improvement lost. At the very least they supply a justification for a "pat on the back," which is too seldom given in many plants.

Briefly, then, a control chart is a running record chart plus a center line and control limits to aid in distinguishing between normal variations in quality and those about which some action should be taken.

The common types of control charts are: (a) Measurement charts including those for averages and those for ranges; (b) percentage of defectives chart; (c) number of defects per unit chart.

Examples of the first type are: Electricity or fuel consumption, analyses, temperatures, timing of process, physical properties, production of units, atmospheric conditions, and sand strength or moisture content. For the second type, the most common is percentage of defective castings. This chart can be broken down to show the causes for defects. Molding losses by man can be kept. Absenteeism is this type of data. An example of type (c) is the chart showing the number of spots of dirt, kish, or holes in 100 castings.

It can be confidently said that practically all of the varying data encountered in day-to-day operation in the foundry may be studied by use of one or another type of control chart. Such charts will tend to sharpen the judgment of those using them.

Table 1 shows some typical foundry data, the characteristic under study being the analysis of copper. Data are shown for 100 analyses from two shifts. These are arranged in 20 samples of five each. The sum of each set of five analyses is listed and the average (sum divided by five) is shown. In the last column are shown the ranges, for example, the largest value in the first sample is 0.65 per cent while the smallest is 0.52 per cent, and so the range is 0.13 per cent. The average and range for each sample provide information respectively on level of performance and variability of performance in that one sample.

These two characteristics are then plotted on two charts as shown in Fig. 4. The calculation of the

TABLE 1—TYPICAL CONTROL CHART DATA AND CALCULATIONS

Sample No.	Copper, per cent					Sum	Sum Divided by 5= Avg.	Range
1	.65	.61	.52	.575	.59	2.945	.59	.13
2	.51	.61	.65	.65	.75	3.17	.63	.24
3	.58	.66	.615	.805	.735	3.395	.68	.225
4	.52	.65	.605	.65	.65	3.075	.62	.13
5	.65	.65	.49	.63	.52	2.94	.59	.16
6	.57	.77	.77	.83	.745	3.685	.74	.26
7	.69	.72	.69	.69	.61	3.40	.68	.11
8	.71	.70	.73	.70	.66	3.50	.70	.07
9	.65	.65	.72	.72	.69	3.43	.69	.07
10	.75	.72	.67	.69	.67	3.50	.70	.08
11	.695	.56	.66	.635	.59	3.14	.63	.135
12	.76	.605	.605	.605	.45	3.025	.60	.31
13	.71	.45	.545	.56	.45	2.715	.54	.26
14	.68	.69	.485	.645	.635	3.135	.63	.205
15	.735	.755	.695	.62	.63	3.345	.69	.135
16	.72	.70	.685	.59	.61	3.305	.66	.13
17	.755	.69	.59	.645	.585	3.265	.65	.17
18	.665	.68	.625	.645	.78	3.395	.68	.155
19	.61	.67	.75	.66	.64	3.33	.67	.14
20	.76	.69	.71	.75	.64	3.55	.71	.12
						Totals........	13.08	3.235
						Averages......	0.654	0.162

Center Lines

$$\text{Grand Average} = \frac{\text{Sum of averages}}{\text{No. of averages}} = \frac{13.08\%}{20} = 0.654\%\ \text{Cu}$$

$$\text{Average Range} = \frac{\text{Sum of ranges}}{\text{No. of ranges}} = \frac{3.235\%}{20} = 0.162\%\ \text{Cu}$$

Control Limits

For Averages: Upper Limit = Grand Avg. + A_2 (Avg. Range) $= 0.654\% + 0.577\ (0.162\%) = 0.748\%$

Lower Limit = Grand Avg. — A_2 (Avg. Range) $= 0.560\%$

For Ranges: Upper Limit = D_4 (Avg. Range) $= 2.114\ (0.162\%) = 0.342\%$

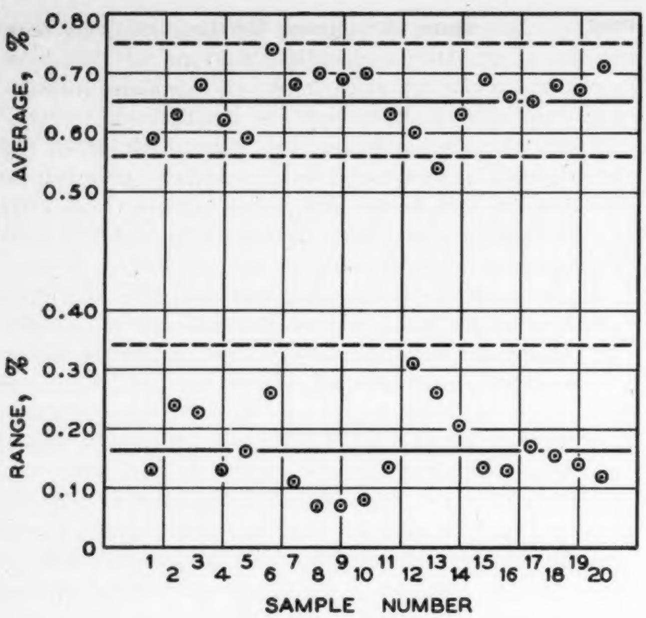


Fig. 4—Control charts showing average copper analyses and ranges, with center lines and control limit lines.

center lines and control limits is easily accomplished as shown in Table 1. (The constants A_2 and D_4 may be looked up in tables, for example, reference 1, p. 50. These constants were determined by mathematical statistics and depend upon the size of the sample chosen, in this case five.) The corresponding lines are drawn on the chart as shown.

The only point worth investigation is that for sample number 13 on the chart for averages (Fig. 4). Beyond reasonable doubt something more than just "chance variation" was responsible for such a low copper analysis. If copper is considered important for the type of casting being made, then the foundry conditions associated with this point should be studied for the cause of such performance. None of the high points is clearly worth studying, nor are any of the range points "out of control."

In addition to control charts there are many other statistical tools which may be of much help to the foundryman. One of the most important is correlation. This technique is designed for studying the relationship between two variables. Thus, for example, if we are concerned with determining what gives high tensile strength we can study the relationship between tensile strength and any of a number of different process variables such as analyses, temperature, timing of the casting and the additions. A useful type of chart for studying the relationship is shown in Fig. 5. Here each point represents the average of five tensile tests for a cast versus the silicon analysis, the latter being plotted on the horizontal scale, and the former on the vertical scale. Such a chart is called a scatter diagram.

This type of chart will give some idea of (a) closeness of relationship; (b) whether the points seem to lie along a straight line or along a curve; (c) any peculiarities such as off-trend points or isolated points (off-practice values), and (d) which of several variables may have the largest influence upon the quality characteristic under investigation. Figure 5 shows that within the current practice conditions there is very little relation between tensile strength and silicon. It does appear that there is a very slight tendency for higher silicon to be associated with lower tensile strength. The one isolated low point would seem to be low because of some factor other than silicon.

Although the scatter diagram may solve the problem completely, it usually is necessary to resort to a more objective technique called correlation. By means of reasonably simple calculations we may obtain a measure of the closeness of relationship between the two variables, and also the equation of the line which best fits the points. This equation is useful in predicting or estimating the quality variable from the process variable if the relationship is at all close. The measure of the closeness of relationship may be used to tell which of the many process variables are worth controlling further, in current practice conditions. As such it can be very useful in further control of quality and in elimination of causes of defective castings.

A second tool is called "significance of differences." One of its typical uses is in comparing quality performances by two molders, shifts, cupolas, practices, patterns, sand sources or minerals. Some difference in performance is always to be expected, even if nothing had been changed in the two samples. The question then is, "Is the observed difference in performance, between these two practices, sufficient assurance that one is better than the other, or could it easily be that there is no real difference between these two practices and that the differences noted are chance variation?"

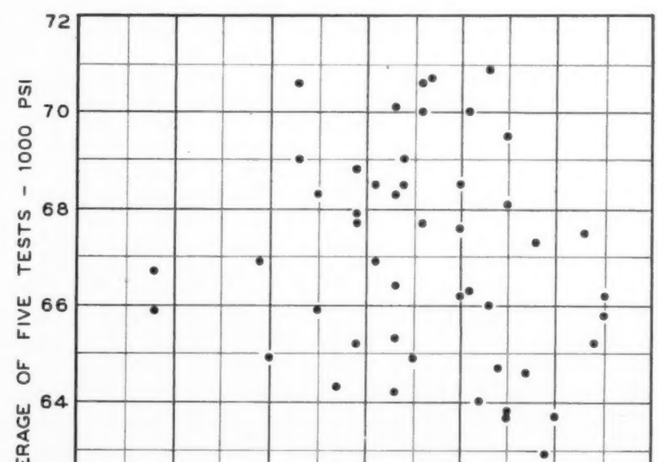


Fig. 5—Scatter diagram plotted to show relationship between average tensile strength and silicon content.

Without the help of statistics it is extremely easy to (a) make a wrong choice between two practices because chance had not been ruled out by taking a sufficient number of cases, or (b) take many more tests than necessary before making a decision. Statistical methods can thus come to the aid of the foundryman in giving him confidence in his decisions.

One more tool may be mentioned. Acceptance sampling is a valuable aid in deciding whether or not it is necessary to inspect a lot 100 per cent before passing it for use. Sampling plans have been worked out so as to provide practically any desired protection against the two possible errors: (a) Passing lots which are actually unsatisfactory, and (b) rejecting for 100 per cent inspection lots which in reality are satisfactory. The important thing in sampling acceptance is to know the risks of making a wrong decision, and what it will cost in inspection money to get such protection. Swinging a good economic balance between these costs is the sensible thing to do in order to save money.

In general, it is possible to use sampling inspection economically and safely whenever a process can be brought into anything like reasonable control at near satisfactory quality. And then, too, there are cases where sampling inspection is the only possible method. If every casting were to be tested for tensile strength, none would be left for sale. Sampling inspection can effect savings on both final and receiving inspection.

Some of the possible objectives and applications of quality control are:

(a) *Finding causes of trouble*—The control chart, properly handled, can be of great aid in finding the cause of poor performance. It can save in two ways —showing where to look for the trouble, and whether further investigation would be a waste of time.

(b) *Stabilizing practice*—By running control charts on process variables the whole practice can be better controlled, thereby achieving more uniform quality.

(c) *Saving on additions*—With better predictability it is possible to save costly elements by not running over the upper specification and averaging nearer the lower specification.

(d) *Decrease in defective castings*—Some remarkable savings have been made in cutting losses on defective castings [3,4]. In one instance the percentage of defective castings was cut from 26 to 9 per cent in two months.

(e) *Improving morale of personnel*—Knowing when to give a pat on the back and providing a tool to help employs do a better job will improve morale. Control charts have been used to help employees make more money when on an incentive plan.

(f) *Better dimensional control*—Causes of off-dimension work or excess variability can be found and eliminated. The control charts are an aid in this search.

(g) *Better meeting of analyses and physical property specifications*—Control charts help control the process variables and analyses and, using correlation to find which ones need further control, the desired results may be obtained.

(h) *Greater accuracy in knowing when to reject a lot of castings*—Control charts and acceptance sampling form a good team on this job.

References

1. *ASTM Manual on Presentation of Data,* American Society for Testing Materials, 1916 Race Street, Philadelphia 3.

2. *Control Chart Method of Controlling Quality During Production,* Z1.3-1942, American Standards Association, 70 East 45th Street, New York 17.

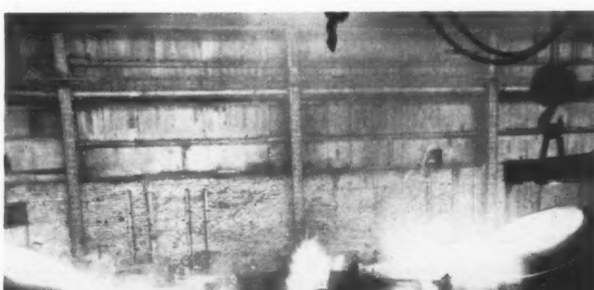
3. A. E. R. Westman and R. W. S. Freeman, "Statistical Control of the Manufacture of Manganese Steel Tank Shoes," *Canadian Metals and Metallurgical Industries,* June, 1945.

4. W. M. Armstrong, "Foundry Applications of Quality Control," *Industrial Quality Control,* May, 1946.

5. Eugene L. Grant, *Statistical Quality Control,* McGraw Hill Book Co., New York.

6. W. A. Shewhart, *Economic Control of the Quality of Manufactured Product* (the fundamental book in the field), D. Van Nostrand, New York.

Pouring 50 Ton Paper Mill Casting At Newport News Foundry



Pouring molten cast iron from 20 and 30 ton ladles. Finished casting will be 100,000 pound Yankee dryer used for paper mill machinery.

Dryer roll casting 18 ft long and 12 ft in diameter on way from the Newport News Shipbuilding & Drydock Co. to the company's machine shop.

CREATING COST CONSCIOUSNESS

Frank Wallace
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McKinsey & Co.
Chicago

This article, reprinted from the July, 1948 issue of *Manufacturers' News*, develops a graphic method of presenting deviations from budgets and departmental cost structures, indicating operations in which costs are out of line and require analysis.

COMPLICATED ACCOUNTING STATEMENTS are road blocks to cost consciousness. Long columnar sheets filled with figures and accounting terms usually contain valuable information; but they are much too forbidding to most executives, who have neither the time nor inclination to analyze masses of complex accounting figures. As a result, they are often in the dark—or at least in a twilight zone— about their costs, even though the accounting statements are technically accurate and complete.

Good cost control reports will not and cannot control costs; only the executives and supervisors in charge of operations can do that. But they must know and understand the cost facts. Experience shows that *good* cost control reports can show dramatically what is going on, and thus stimulate interest and provide an incentive to do something about costs.

Midwest Company Attacks Costs

For example, one medium-sized company near Chicago recently was feeling the squeeze of increased costs. Although profits were good, the president decided the cost trend was unhealthy and that something should be done about it.

Over the past two years he had made pep talks about reducing costs, but nothing happened. So he developed a concrete plan for action. As the first step, he sought to stimulate cost consciousness up and down the line by improving cost control reports.

A review of the accounting system showed that it was good. However, discussions with vice-presidents, the factory manager, and foreman revealed that they did not clearly understand the cost reports and, therefore, made little use of them.

These reports were sound and accurate from a technical accounting point of view. But, they did not ring the bell with operating men because they reflected an accounting department instead of an operating department point of view.

A Foreman's Spirit Is Killed

For instance, one foreman had made a "New Year's resolution" to reduce costs in his department. The first month he worked hard at cost control. When he received his monthly statement he found his costs were up. He worked even harder the next month, but the statement showed his costs were even further out of line. So he said, "The heck with it."

Nevertheless, an analysis of the two months' statements revealed that actually he had reduced the costs under his control. But allocated charges from other departments had increased and had more than offset the cost reductions he had made. His cost reports did not show this so that he could understand it.

Thus, the accounting mechanics killed the spirit of a foreman who was doing a good job of reducing costs in his department.

Developing Profit Control Chart

After the cost control statements were overhauled, the president wanted a summary that would show company-wide results on one sheet of paper. The "Profit Control Chart" was developed for this purpose. This chart shows how actual results varied from the budget. It is designed to show quickly which departments are deviating from the budget.

From this chart the president can draw the following conclusions—almost at a glance:

1. Net profits are down $40,000 from budget.
2. Gross profit, however, shows a $15,000 gain over budget; selling expenses are up $10,000.
3. Administrative expenses are down $5,000 in total; only the research department spent more than its budget.
4. Manufacturing costs are $50,000 in excess of standard costs. Most of the excess ($35,000) is noncontrollable by the manufacturing vice-president—price increases of raw materials and under-absorbed overhead.
5. Controllable manufacturing costs are $15,000 over standard costs. These excesses are primarily in the machine shop and the assembly department.

Obviously this chart does not take the place of the regular profit and loss statement and supporting schedules. It does call attention to departmental control reports that should be looked at more closely. It facilitates the review and interpretation of operating results by the busy executive, and points the direction for investigation. Naturally, the controller will analyze those operations that need attention.

Action Stimulated Down the Line

Although the president found the chart and new reports quite useful, the payoff came from action down the line. The factory manager realizes for the

first time that maintenance costs are far out of line. The figures contained this fact about maintenance costs all along, but it was buried in accounting technology. The revised reports brought it clearly into the open, and the factory manager is looking into maintenance costs.

The new reports were well received even farther down the line. A foreman said that for the first time he could see what was happening to costs in his department. And he added shrewdly, "The boss'll see these figures too so I guess I'll have to get going."

Another foreman said work is more fun when you have something to shoot at and can see "how you're doing." Getting reports like these "makes it something like being in business for yourself," he observed.

How New Reports Were Prepared

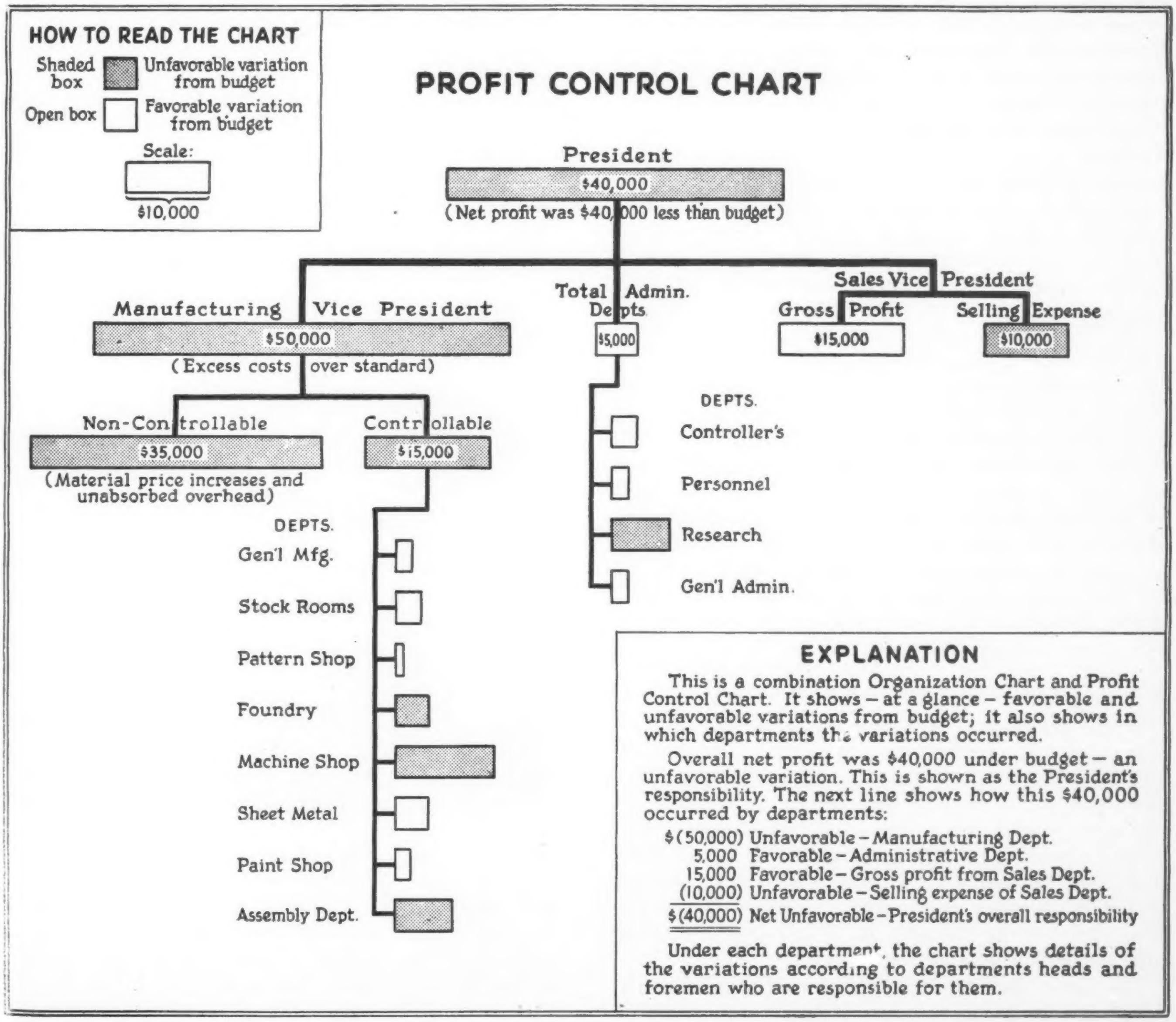
The company already had a good budget and standard cost plan. These were used to the utmost in the revised control reports. The new control reports had these three characteristics:

1. All cost and income items were segregated according to department heads who had the most control over them. Therefore, each department head saw clearly the cost items for which he was responsible.

2. The budgets and standard costs were used as yardsticks to compare with actual results. The deviations from budget or standard were computed. This enables department heads to concentrate on items which are out of line. Attention is focused on the weak spots.

3. Great care was taken to eliminate technical accounting concepts that confused the non-accounting department head. Common, everyday terms were used. Figures were arranged to avoid confusing debit and credit concepts which are inherent in accounting. Every effort was made to make each statement a common-sense report to the department head. This was one of the most difficult steps. Those who have been through the process know that it is a complex job to reduce a mass of detail to a simple form.

Such a plan for control reports will not reduce costs in itself. It *will* create an interest in costs. That is the starting point in cost reduction. When supervisors watch actual results in comparison with standards they have had a hand in setting, they usually start figuring ways of getting costs down. If a sufficient number of men in a company start thinking in this direction, results are certain to follow.



WOOD FLOUR ADDITIONS AID IN FOUNDRY SAND CONTROL

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WOOD FIBER, in one form or another, appears as an addition to molding sands throughout the history of the foundry. With the use of synthetic sands has come increased volume changes in the sand body forming the mold, a condition familiar to every foundryman who has experienced difficulties with scabs, rattails and buckles. The foundryman is constantly searching for procedures which will make his job easier. With knowledge of the functions of the foundry raw materials used, he is able to apply them to obtain the desired results. Therefore, an explanation of the functions of one wood flour, which has been investigated and is in foundry use, should be of interest.

Expansion and contraction are introduced whenever materials are exposed to heat and allowed to cool. All foundry molding sands expand and contract. Foundry sands high in silica content are no exceptions to this rule and must be carefully handled. Metal may be termed a homogeneous material because it shows a uniform rate of expansion and contraction. This is not true with siliceous materials as they undergo certain mineral changes and are not homogeneous.

Many sand authorities advocate a uniform sand, that is, a sand with from 60 to 80 per cent of the grains distributed over three adjacent screens. While such uniformity of sand grain distributon may assure the highest permeability, such sands usually have a high expansion or unusual volume change. The more uniform a sand becomes (the closer it approaches distribution upon a single screen), the greater is the increase of expansion of the sand as a mass. Explanation for this lies in the fact that there are no "fines" lying within the normal void space in the sand which would help to cushion the change in volume.

Expansion and Heat Penetration

A coarser, more permeable sand shows the effect of expansion under heat deeper than a fine, nonpermeable sand. Heat travels through the void space of the more permeable mixture and penetrates further. In the same vein, a dry sand facing has a greater heat penetration than a green sand mixture with the same base sand. Moisture in a mixture decreases contraction but increases expansion. Moisture is directly dependent on the clay present, as moisture alters volume change by its effect on the clay.

Normally, the clay content introduced into the sand mixture is supposed to balance the expansion and contraction of the sand grains, as clay shrinks when subjected to heat. Seacoal, cereal and other organic materials are also used as buffers against expansion, as all decrease the volume change.

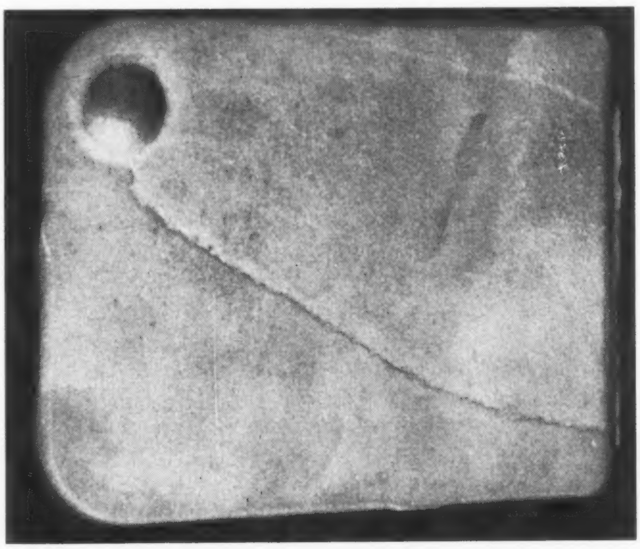
With all of these variables, it is essential that the sand grains, the clay, the auxiliary binders, and the moisture content function as one unit if the molding mixture is to be acceptable. Today, we attempt to control sand mixtures to closer tolerances, and are purchasing materials which are more closely controlled in manufacture.

However, one factor that greatly influences any foundry molding sand mixture—and which is not controllable—is the human element. A classic example of this is a molder who uses a weak sand and rams harder than usual in order to get the pattern to draw. The finished castings may be deformed, cracked, show rattails or scabs, and the diagnosis may be overexpansion of the sand grains. To overcome this condition the molder rams softer, but the finished casting may then show swells, cuts or washes. Consequently, there is a need for a material which will provide a reasonable

Result of hard ramming in "ear" section of mold. Section thickness of this 8-in. ear was only ½-in., and it was difficult to prevent hard ramming as the body of the casting had to be rammed hard in order to have the sand flow around several pockets and recesses. Blows and scabs were common until 1 per cent of wood flour was added in order to "buff" sand expansion.

safety factor and one which the foundry technician can blend into a sand mixture. This material should eliminate or nullify the uncontrollable human factor.

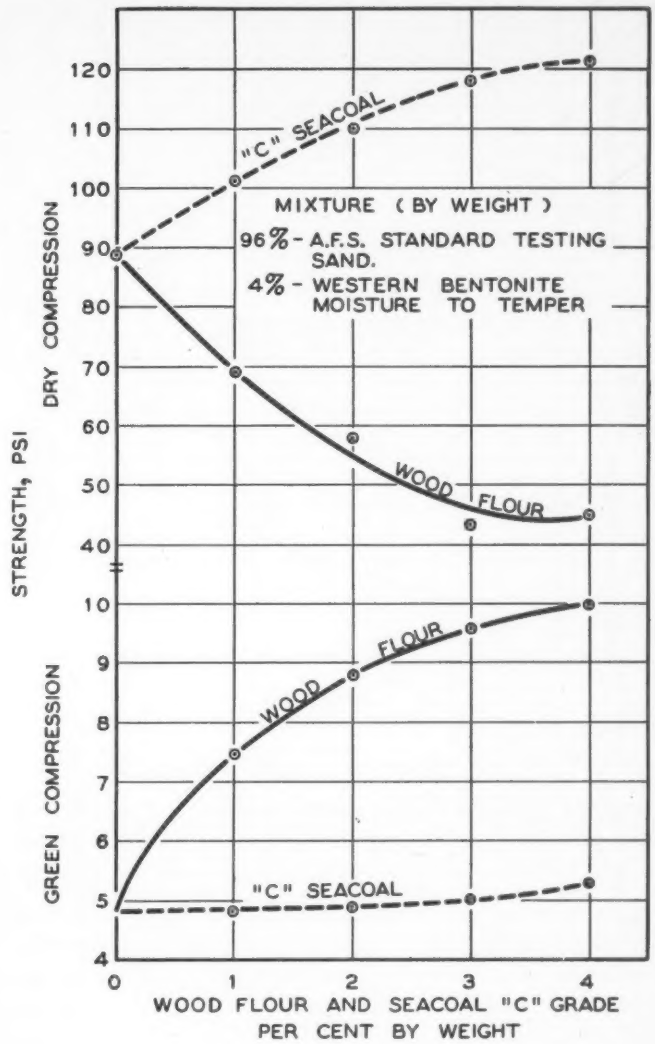
In 1929, Frank G. Brotz secured a patent on the use of wood fiber to prevent the usual burning-out of molding sands. He considered the burning-out of vegetable fiber in the sand the basis of his patent, and claimed he would be able to reuse burnt-out sand by restoring this vegetable matter. In adding granulated wood or sawdust, a greater quantity of moisture could be absorbed and retained. The heat-resisting properties were found to be bettered and the resiliency of the sand was improved to resist "over tamping" and to permit the casting to shrink without cracking. He adds in his patent claim that he found it advisable to use as high as 20 per cent absorbent material, such as sawdust, wood flour, vegetable fiber or any of the natural fiber material. Brotz further found that a mixture containing wood fiber gave a sponginess to the sand, and claimed that while the sand had a longer moisture retaining feature, it facilitated venting and provided greater heat insulation. Furthermore, it more readily yielded under pressure resulting from contraction of the casting upon cooling and so prevented



A gray iron casting with a rattail defect which is common to thin-sectioned castings of flat design. This casting is only 3/16-in. thick and quite sensitive to ramming. With an addition of 1 per cent (by weight) of wood flour to the facing sand mixture used, all forms of defects caused by sand expansion were eliminated.

damage by distortion or the development of undesirable stresses. He found that cleaning of castings was greatly reduced and much less sand replacement was required in the heap.

Further back, in 1883, Thomas D. West mentioned in his book, *American Foundry Practice,* certain loam mixtures used during that period which were considered modern practice. On page 347, he states, "There are two classes of sand which generally combine in order to make a loam, one is a close, clayey nature, and the other is sharp or coarse open-grained sand. The clayey sand gives a body to the loam, while the



Wood flour and seacoal additions effect on green and dry compression strengths of molding sand mixtures.

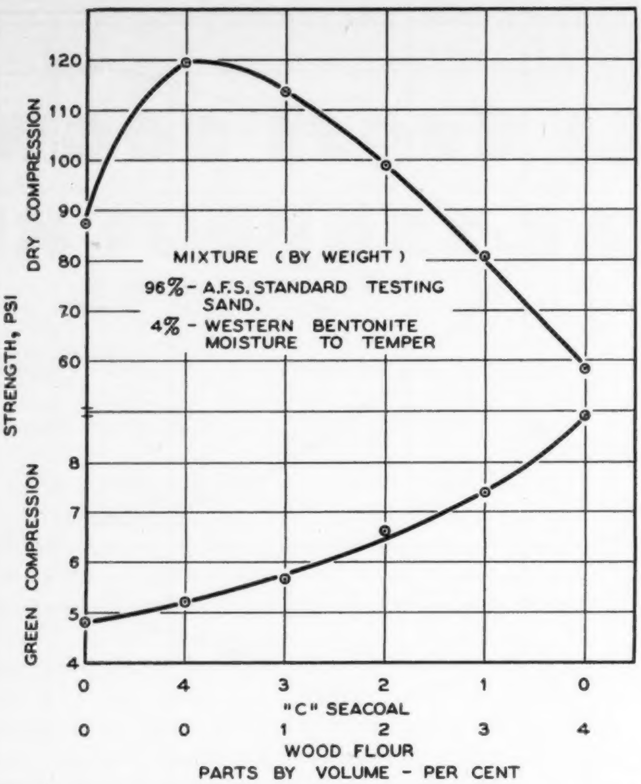
sharp sand makes the loam open and porous, so that the iron will kindly lay against its surface. . . . The following are a few loam mixtures which have worked well, and are given to show the proper proportions of parts and the method of mixing loams:

Mixture No. 1—3 pails of fire sand; 2 pails of molding sand; 1 to 10 pails of horse manure; wet with thick clay wash.

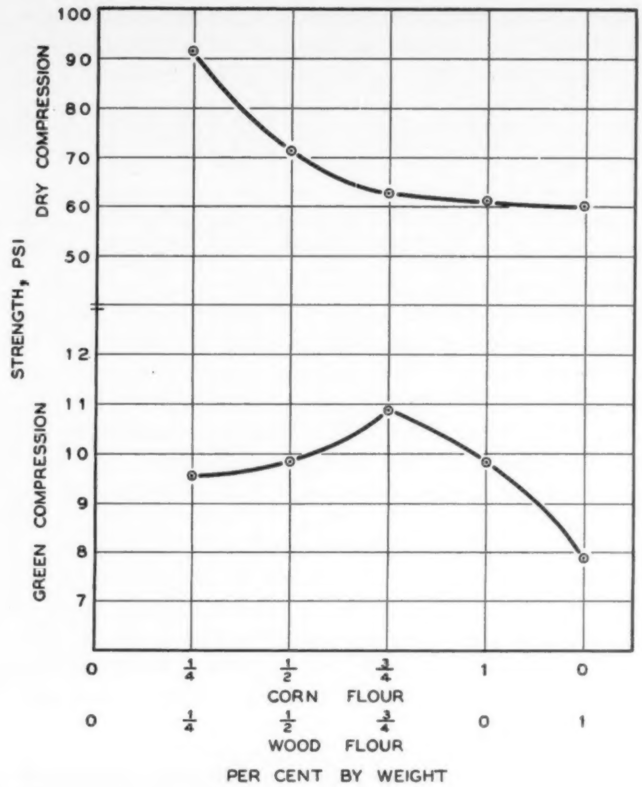
Mixture No. 2—4 pails of fire sand; 1 pail of molding sand; 1 pail of dry sieve fire clay; 1 pail white pine sawdust; wet with thin clay wash."

Mr. West also endeavored in this early thesis on foundry practice to explain the causes of scabs, buckles, rattails and the many other casting defects encountered without any indication of the part played by the manure and sawdust. Today we know that those materials permitted movement of the sand grains as they expanded and contracted upon heating and cooling.

Until recently many foundrymen considered the use of wood flour for core work only. Some erroneously considered wood flour as a binder, and substituted it entirely for cereal binder. Such cores were found to have less green strength, which resulted in cores collapsing and sagging when heated. However, in molding and core practices where cereal is used, wood



Seacoal and wood flour additions effect on green and dry compression strengths of molding sand mixtures.



Effects of corn flour and wood flour additions on green and dry compression strengths of sand mixtures.

flour may act as an extender. Cereal furnishes some green strength to the molding sand mixture and, when wood flour partially replaces some of the cereal, additions of bentonite or like bond must be made to maintain proper working strength, although that is disputed with some mixtures.

Shakeout is much improved by very small additions of wood flour, as hot strength is reduced. Hot tears and casting cracks are reduced by adjusting the wood flour content of the green sand core mixture until the proper degree of hot strength has been secured, which will allow the casting to contract naturally.

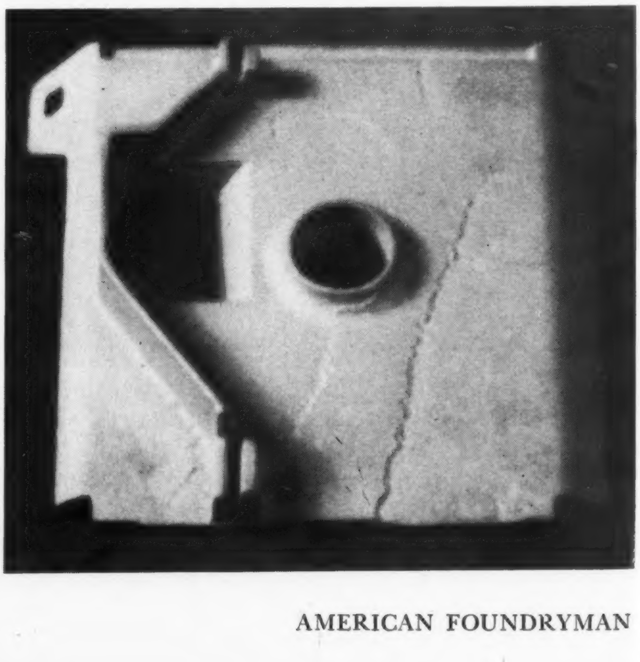
Wood flour furnishes good flowability to foundry sands and imparts extra smoothness to the casting. Sands that have good flowability can be rammed tighter around pockets or bosses on the pattern without fear of causing too great an expansion, and thus provide better casting finish. Recent investigations have shown that a reducing rather than an oxidizing atmosphere in the mold cavity is advantageous in that the metal lies more quietly in the mold and is less active against the mold-metal interface. Wood flour, by furnishing a reducing atmosphere, directly influences the production of a smoother casting surface, with consequent reduced cleaning costs. The low flash point of finely ground wood flour tends to absorb all the oxygen by combustion in the mold cavity when the metal enters the mold.

Small additions of wood flour, replacing greater weight of seacoal, tend to give added protection in the manufacture of gray iron and malleable castings. Wood flour is cleaner than seacoal, and in some instances combinations of the two are recommended, the ratio depending upon the physical properties desired.

Normally, substitution of wood flour for seacoal by volume is part for part. "C" grade seacoal weighs approximately 36 oz per qt, whereas a finely ground wood flour weighs only 10 oz per qt.

The edges of a mold are more friable when large amounts of wood flour are incorporated into the sand mixture, but large additions of wood flour are not recommended. Wood flour tends to increase the water holding capacity of the sand and, to get the same "feel," the moisture content must be increased as the wood flour is increased.

When a very smooth casting finish is desired such as in stove plates, certain fire pot castings, bath tubs,

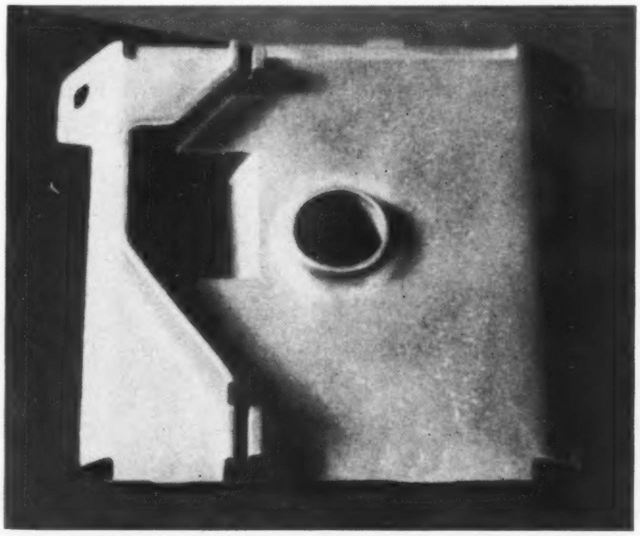


various sanitary ware and non-ferrous castings—wood flour works well. In pouring these thin-sectioned castings, such a large quantity of metal is required to flow at high speed and with fairly high temperature over the mold face that there is a tendency to burn out the sand too rapidly. A rapid loss of moisture in these weak, fine-grained sands will allow the sand grains at the face of the mold to expand instantaneously. This may result in washes, cuts, buckles, rattails and scabs. Wood flour, by retaining a higher working moisture content and supporting a reducing atmosphere in itself, eliminates the expansion tendency of the sand grains in the molding mixture.

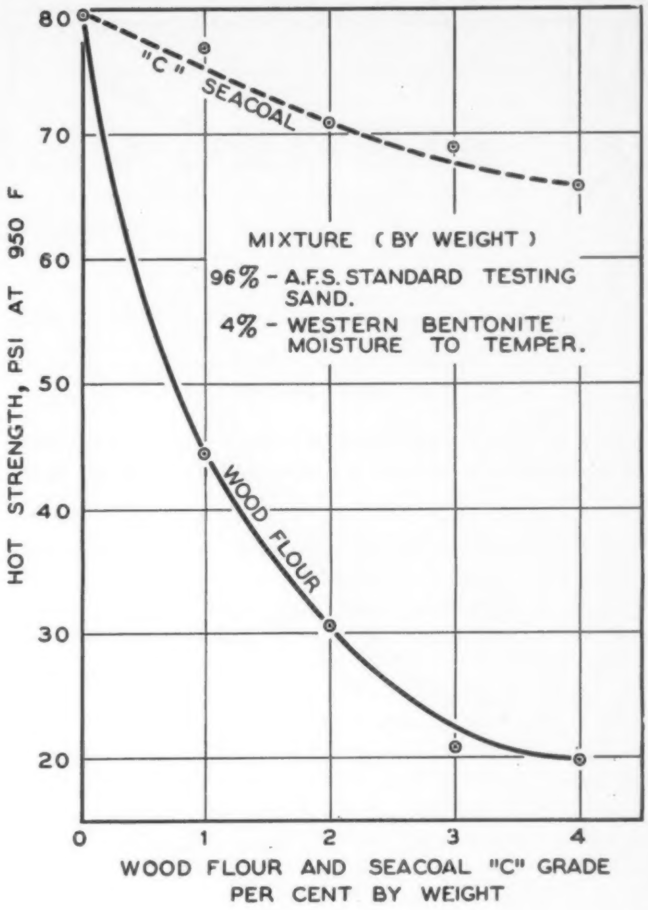
All manufactured wood flours perform differently in molding sands, but two important characteristics seem to have the greatest effect upon the action of the wood flour, namely, the fineness of grind and the alcohol solubles present. For example, a coarse grind of sawdust produces low strengths and, usually, a very finely ground wood flour attains high strengths. A wood flour with zero per cent solubility in alcohol usually offers little strength, whereas a wood flour with, say, 20 per cent alcohol solubles, has good strength. These examples are general, and each wood flour adds its own properties to the molding sand.

The wood flour tested showed the following results with ½ per cent and 1 per cent additions to the molding sand:

Green Strength—Increases, due to a denser sand and more solubles in wood flour.
Dry Strength—Decreases slightly.
Hot Strength—Decreases greatly.
Permeability—Decreases.
Flowability—Increases.
Moisture—Increases.
Mold Hardness—Increases.
Deformation—Increases (some wood flours show much decrease).
Volume Change—Greatly reduced. This is the principal reason for its use.
Mold Cavity Atmosphere—Reducing. Quite advantageous.



Left—Casting with rattail defect which was caused by high sand expansion due to even grain distribution of molding sand. Above—The defect was eliminated when wood flour additions were made directly to the molding sand, a more economical procedure than controlling grain distribution by changing the sand.



Wood flour and seacoal additions reduce hot strength.

All wood flours vary in properties, and thus vary the properties of the sand to which they are added. For example, screen testing disclosed a wide range in grain finenesses of several wood flours (see Table).

It appears that the coarser wood flours lower green compression strength, soak up more water, have more friable edges, but promote faster collapsibility. Density of the sand is less with coarser wood flours. Finer ground or screened wood flours tend to increase density (if held to minimum additions), increase green compression strengths, but have higher hot strengths than the coarser flours.

Combustible raw materials must be handled carefully in the foundry. Proper storage is quite important, as wood flour, seacoal, pitch, and other materials are quite easily ignited.

Unloading of the material should be under supervision. A discarded cigarette in the stacked bags may

SCREEN TESTS—VARIOUS WOOD FLOURS

Mesh No.	Retained on Screen, Per Cent "A"	"B"	"C"	*"D"
50	0.0	0.5	12.1	0.0
65	0.0	29.2	18.5	0.0
80	1.2	25.0	17.7	1.1
100	5.2	10.9	7.7	5.8
200	54.2	24.5	18.5	14.5
Pan	39.4	9.9	25.5	78.6

* All data were collected from "D" brand wood flour.

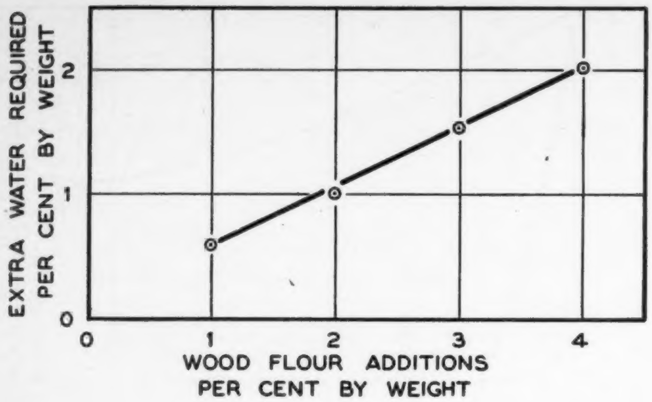


Chart showing additional moisture required because of wood flour additions to the molding sand mixture.

start a fire which will smolder for days before bursting into flame, and it is almost impossible to reach the source of the fire by hose. Bags should be kept from contact with damp flooring, as any combustible material, upon absorption of water, is subject to spontaneous combustion. This is true of a haystack as well as corn flour, wood flour and seacoal.

All combustible material should be stacked with an open space between each row of bags to allow air passage and, in case of fire, provide access for fire-fighting equipment. Wood flour and seacoal bags should not be stored near the cupola or furnace because of the hazard from intense heat, hot slag or sparks from the molten metal.

It is good practice to store such inflammable material in small lots, preferably outside of the plant in cool and ventilated storage bins not easily reached by casual workers who might use the bins for lunchrooms or small group meetings where lighted matches and cigarettes come into play.

Many cases have been reported where seacoal and wood flour have caught fire and caused damage to the foundry before proper protection could be employed. In all cases it was found that the fires were caused by carelessness or improper storage of the material.

Combustible materials are used in the foundry by reason of their combustion properties. If the foundry is to use inflammable materials such as lighted-off mold washes containing gasoline, alcohol, or other hazardous materials, it must maintain proper storage and use them with proper precautions. One large foundry has been using a mold spray of gasoline, shellac and graphite for years, and has yet to report a serious explosion or fire from its use.

Manufacturers have taken every precaution in furnishing materials which do the job properly, and have investigated the possibilities of hazards quite thoroughly, but they have found no way of preventing improper handling, improper storage, or carelessness on the part of the consumer.

Blast Furnaces' Conversion To High Top Pressure Operation Ups Output

INCREASED PRODUCTION AND ECONOMY have been effected as the result of converting blast furnaces at Chicago and Warren, Ohio, to high top pressure operation, according to the Republic Steel Corporation. Republic has had two other converted blast furnaces operating at Cleveland and Youngstown for some time and plans to convert three more.

Operating results of the four pressure furnaces confirm expectations of higher productivity and greater economy based on experimental operations begun in 1944. Officials state that mechanical difficulties previously encountered have been reduced to such a degree that lost time is now no greater than that on a normal blast furnace.

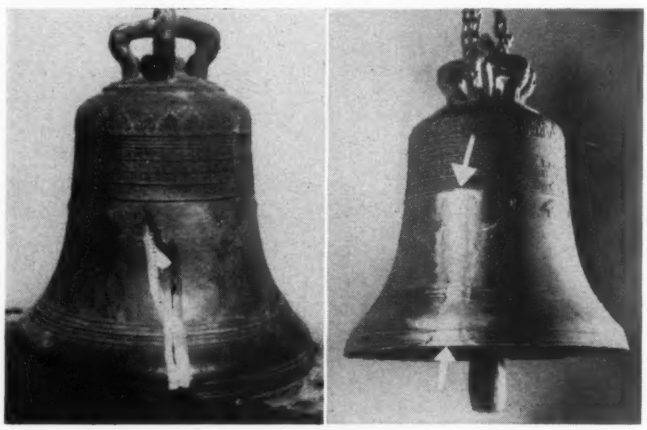
Break Tonnage Records

The Chicago furnace, at top pressure for only three months, broke its previous monthly tonnage record in August by 3000 tons. The Cleveland furnace, operating on an essentially straight ore burden, has averaged 1250 tons a day for the last six months at a wet coke rate of 240 lbs per ton of iron less than any other furnace in the Cleveland district.

The Youngstown furnace produced an average of 170 tons more per day, at 300 lbs less coke per ton of iron during the same six months' period.

The pressure furnace at Warren has been producing over 1340 tons per day while operating at 6 psi top pressure and 92,000 cfm with two old turbo blowers run in parallel. Installation of a 125,000 cfm, 40 psi has just been completed. The furnace is now being operated at 10 psi and the new blower will permit operation at top pressure exceeding 12 psi, with consequent increase in tonnage and lower coke rates.

Republic officials announce that blast furnace men from all over the world are watching the furnaces' operating results, and that other steel companies here and abroad will also have pressure furnaces in operation within six months.



This historic church bell, cast 282 years ago in Switzerland, cracked recently (left). The damaged section of the 500 lb bell was welded with a low-melting, flux-coated welding rod produced by a New York firm. The rod is coated with an improved flux coating, has a reported tensile strength of 57,000 psi, is non-fuming with non-ferrous metals, and produces dense, homogeneous welds with no distortion. The tone of the repaired bell (right) has since proved highly satisfactory.

IRON IN BRASS AND BRONZE

Rapid Colorimetric Determination

Milton Sherman
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IRON CONTAMINATION in brass and bronze castings has a deleterious effect on machinability. Although removal of iron from the melt by the smelter is a simple matter, the foundryman often has to cope with the problem of the metal accidentally becoming contaminated with iron. A simple and rapid procedure for the determination of iron in brass and bronze would offer a convenient method for ascertaining whether the metal meets specifications.

A great number of organic and some inorganic reagents[1] have been proposed for the colorimetric determination of iron. Among the more common are ammonium thiocyanate, o-phenanthroline, hydrobromic acid, tiferron, sodium salicylate and sulfosalicylic acid. These in particular have found applications in metallurgical analysis.

Literature Surveyed

With the majority of reagents a separation of second group elements is necessary prior to the iron determination. This step introduces hazards both as to the incomplete separation of impurities and danger of loss of iron by coprecipitation, and also prolongs the procedure. With some reagents the iron must be completely in either the ferric or the ferrous state, a condition not always easily attainable, while with many reagents the close control of pH is necessary.

A survey of the literature was made for a more suitable reagent. Many references[1] were found to use thioglycollic acid for the determination of iron in biological materials. This acid is known under other names such as mercaptoacetic, thioethanic and thiolacetic acid. Only one reference[2] to a metallurgical application for the determination of iron in cadmium was found.

Many contradictions appeared in the literature as to the effect of anions and cations on the iron color. As a result, we instituted a systematic study of the reagent (thioglycollic acid). The work of Mellon and his coworkers[3] was substantiated in that this reagent is superior to both thiocyanate and ferron for the determination of iron. The usefulness of the reagent was extended in our laboratory to the point where iron could be determined in brass and bronze without making separations.

None of the elements normally associated with these alloys interferes except nickel, and then only when present to the extent of over 2 per cent. With an excess of ammonium hydroxide present, the iron color will develop, thus eliminating the need for careful pH control. The color fades on standing but can be brought back to full strength by shaking, even after standing a number of hours.

The valence state of the iron is immaterial since thioglycollic acid is a powerful reducing agent and will reduce the iron even in the presence of many oxidizing agents. Complex ion-forming agents such as phosphates, tartrates and citrates are without effect on the color. The color follows Beers' law very closely over a wide range of iron concentrations, thus greatly simplifying the setting up of curves. A determination under routine conditions is easily completed in 5 min. This includes time for drilling and weighing.

Using a sample weight of 0.1 gram and a final dilution to 100 ml, iron may be determined in the range from about 0.05 to approximately 1.0 per cent with an accuracy of within 0.01 per cent of the true iron content. By increasing the sample weight for the lower ranges and by taking a smaller aliquot for higher iron contents we have determined iron with good accuracy from a few thousandths of a per cent in copper to over 10 per cent in copper-iron alloys. Table 1 lists the results obtained by this procedure on the United States Bureau of Standards brasses and bronzes.

Reagents and Solutions

Hydrochloric Acid—concentrated.

Hydrogen Peroxide—30 per cent.

Citric Acid—250 grams dissolved in water and diluted to one liter.

Ammonium Hydroxide—concentrated.

Thioglycollic Acid—approximately 70 per cent (obtained from one chemical supply house). Some samples obtained from other chemical supply houses had a yellowish color and precipitate, evidently free sulphur. However, results obtained with the use of this acid seemed to be satisfactory.

Procedure

1. Transfer 0.1 gram drillings or shavings to 125 ml conical flask and add 3 ml hydrochloric acid and 2 ml hydrogen peroxide.

2. Swirl, place on a hot plate and boil until foaming ceases. The disappearance of white foam indicates the destruction of excess peroxide.

3. Cool in running water for about 15 sec and trans-

fer the solution to a 100 milliliter volumetric flask.

4. Add in the following order with shaking after each addition: 3 ml 25 per cent citric acid, 10 ml ammonium hydroxide, 2 ml thioglycollic acid. Dilute to 100 ml mark with distilled water and mix well.

5. Transfer a portion of this solution to a colorimeter tube, stopper, agitate and, when the fine bubbles have disappeared, read density using a green filter or a wave length of approximately 530 millimicrons.

The density curve may be calibrated by the use of ferrous ammonium sulphate, pure iron, or by brass and bronze standards of known iron content. In using ferrous ammonium sulphate or pure iron, copper or other elements need not be added to duplicate a brass or bronze. Under the conditions of the determination, aside from the exceptions later noted, there is no blank for a wide range of alloy compositions. The procedure was first set up using a standard spectrophotometer. For rapid control work a spectrophotometer equipped with a yellow-green filter proved satisfactory.

Effect of Cations and Anions on Iron Color

Copper, tin, lead, zinc, nickel, antimony, aluminum, manganese, silicon, phosphorus and sulphur are the elements to be considered for possible interference. On the basis of the spectrophotometric study by Swank and Mellon[3], interference could be expected in the presence of small quantities of copper, lead, tin, aluminum, nickel and zinc. The addition of a large quantity of thioglycollic acid overcomes the bleaching effect of the tin, lead, and zinc. The addition of citric acid prevents the precipitation of aluminum.

In the case of nickel it was found that the combination of citric acid and ammonium hydroxide allowed the presence of 0.2 mg per 100 ml without affecting the iron color. Larger quantities of citric acid and ammonia did not increase the tolerance for nickel. More than 0.3 grams of copper produced a light yellow color. For the determination of very low irons where a larger sample size is used, a blank on a corresponding weight of iron-free copper should be run. Cobalt interferes badly but, fortunately, is rarely found in brass and bronze. Manganese, under the conditions of the determination, offers no interference. High-silicon-bearing materials, where some silicon might be precipitated out during the dissolution of the alloy, may be treated with hydrofluoric acid to dissolve the silicon.

Among the anions, nitrite, cyanide and peroxide interfere. Fluoride, iodide, nitrate, sulphate, acetate, tartrate, citrate, oxalate, and orthophosphate do not interfere. This freedom from interference from so many anions and cations makes possible the determination of iron under many different conditions.

If desired iron can be determined on an aliquot of the solution after plating out the copper and lead in nitric acid or after plating in nitric hydrofluoric in the presence of the tin and antimony. After the determination of nickel colorimetrically, the addition of thioglycollic acid to the solution will destroy the nickel color and the iron can be determined on the same solution.

By making slight changes in the procedure the method may be used for the colorimetric determination of iron in a number of other non-ferrous products. In this laboratory iron in zinc-base alloys is determined by using a one-half gram sample to a final dilution of 50 ml for the range of 0.005-0.15 per cent iron. The amount of thioglycollic is increased to 5 ml and the ammonia to 15 ml. Iron in lead may be determined by dissolving the sample in nitric acid. The procedure may be used without modification for iron determination in tin, antimony and aluminum.

TABLE 1—ANALYSIS FOR IRON BY THIOGLYCOLLIC ACID METHOD

U.S.B.S. Sample No.	Iron Present, per cent	Iron Found, per cent
52b	0.032	0.035
		0.030
		0.035
37d	0.075	0.080
		0.078
		0.075
124b	0.26	0.26
		0.26
		0.27
63a	0.52	0.52
		0.53
		0.53
63b	0.47	0.48
		0.47
		0.47
62	1.13	1.11
		1.12
		1.12
62b	0.82	0.81
		0.82
		0.82

References

1. F. J. Welcher, *Organic Analytical Reagents,* vol. 1-4 (1947-48), D. Van Nostrand Co., Inc., New York.

2. H. G. Isbell, "Rapid Determination of Zinc and Other Impurities in Cadmium," *Industrial Engineering Chemistry,* Ana. Ed., 4, 284 (1932).

3. H. W. Swank and M. G. Mellon, "The Determination of Iron With Mercaptoacetic Acid," *Industrial Engineering Chemistry,* Ana. Ed., 10, 7 (1938).

New Laboratory Technique Detects Hairline Flaws In Castings, Forgings

HAIRLINE FLAWS IN CASTINGS and forgings can be detected by means of a new technique utilizing fluorescent lights, a mirror and a surveyor's telescope, it is announced by General Electric Co.'s Schenectady, N. Y., Works Laboratory. This laboratory technique, according to General Electric engineers, can find flaws 1/500 in. wide in a boring 35 ft. long—a task comparable to finding a pin scratch inside the drainpipe of a three-story house.

In the process, the forging is first magnetized and iron oxide particles are blown down the hole. These particles align themselves with the north and south magnetic poles of any cracks or flaws which are present. Then a small cylinder on which three fluorescent tubes and a small mirror have been mounted is drawn slowly through the hole. As the cylinder moves through the boring, the surfaces reflected in the mirror are examined through the surveyor's telescope. Flaws present in the forging are outlined by the iron oxide particles, and are then visible.

ENRICHING CUPOLA BLAST WITH OXYGEN ADDITIONS

This paper is the fourth of a series, dealing with modern cupola operation, sponsored by the Cupola Research Committee of A.F.S. Previous papers appeared in the March, April, May and October 1948 issues of American Foundryman. Reports on cupola investigations now being conducted will appear in future issues.

MANY FOUNDRYMEN are interested in the advisability of using oxygen in cupola operations. Comprehensive production data are not available. One laboratory experiment and two production experiments have been reported in the literature in recent months. Several other production experiments have been conducted, but the data have not been published. Although it is not possible to present conclusive arguments for or against the use of oxygen enriched blasts at present, it may be well to analyze and evaluate the data available.

Interest in the use of commercial oxygen for blast enrichment arose when extensive experimentation in its use began in the steel industry. This interest was heightened by the paper of F. Morawe[1], who reported experimental work carried out in a 35.43-in. internal diameter cupola running 6-hr heats. The following conclusions were reached:

1. The highest saving in after-charge coke amounted to 2.64 lb of carbon per 220 lb of cast iron (24 lb of carbon per ton of cast iron or, assuming that coke contains 90 per cent fixed carbon, this is equivalent to 26.6 lb of coke per ton of cast iron).
2. The largest increase in melting efficiency was attained with 23.77 per cent total oxygen in the cupola blast. The average increase in melting efficiency in the experiments was approximately 25 per cent. The results are plotted in Fig. 1.
3. Increasing melting efficiency resulted in increased effluent gas temperature and lower temperatures for the molten metal.
4. Iron losses when using air blast amounted to 0.24 to 0.60 per cent, whereas with the oxygen enriched blast iron losses were 0.12 to 0.51 per cent.
5. The carbon and phosphorus contents of the metal remained unchanged.
6. Lower manganese in the charge caused an increase in the oxidation of silicon.
7. Slagging of silicon increased with higher melting efficiency. This, however, occurred with or without oxygen additions.
8. Sulphur pickup when using air varied from 89.40 to 63 per cent, while oxygen enriched blast resulted in a sulphur pickup of 48.36 to 35.71 per cent.

After reviewing the results and examining Fig. 1, a question arises as to whether the basic heats run with air were at the point of maximum efficiency or if the oxygen additions compensated for the lack of it. This report does show that an increase in melting rate and a decrease in coke required are affected by small additions of oxygen to the blast.

Since large quantities of commercial oxygen cannot be made available at one time for extensive blast enrichment experiments in production cupolas, experimentation in this country has been divided into two categories. The first group consists of experiments in which larger quantities of oxygen are added to the blast for short periods. The second group consists of experiments in which low concentrations of oxygen are added to the blast continuously.

It is difficult to visualize the quantity of oxygen necessary to conduct one of these experiments. For the sake of clarity, let us assume that a cupola lined down to 72 in. internal diameter is using 9200 cu ft of air per minute. It will require 92 cu ft of oxygen per minute to increase the total oxygen content of the blast by one per cent. Thus, it will require 5520 cu ft of oxygen per hour, or 44,160 cu ft for an 8-hr heat. There are approximately 24,000 cu ft of oxygen in one ton. Hence, this cupola will require in excess of one large oxygen trailer of the Airco type every 8 hr for each one per cent of oxygen added to the blast.

Short-Period Additions Are Beneficial

Despite this handicap, several experiments were conducted for production periods of almost 19 hr. Others have been run for shorter periods. It is felt that the longer experiments, in which conditions have more nearly reached equilibrium, more clearly indicate the results that may be expected with oxygen enrichment. However, it should not be inferred that the short-period additions of oxygen to the cupola blast are not beneficial.

Tests in which oxygen is added for short periods usually are of the intermittent type. These tests show that:

1. The time from blast-on to the first tap is reduced by 22 to 24 per cent[2,4] when using from 24.8 to 26.7 per cent oxygen in the blast.
2. The melting rate was increased substantially in one case[2] (24.8 to 26.7 per cent oxygen in the blast),

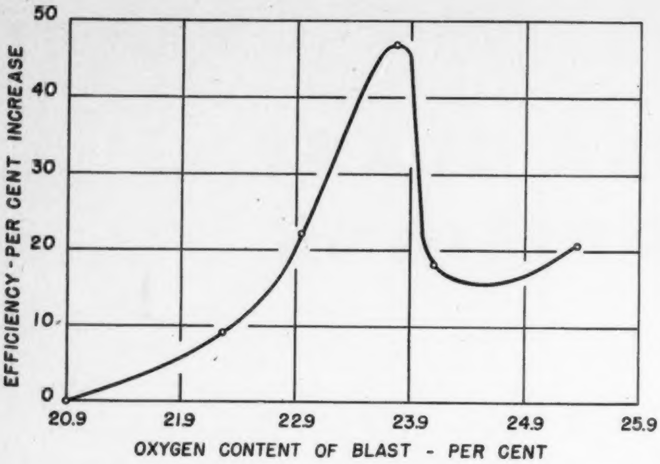


Fig. 1—Chart showing increased cupola efficiency as a result of oxygen enriched blast, reported by F. Morawe[1].

approximately 18 per cent with 25.4 per cent oxygen in the blast in another[4], and with a 30.9 per cent oxygen blast using an 8:1 coke ratio the melting rate was increased by 20 per cent in a third case[3]. In the latter paper[3] increased melting rates are extrapolated on the basis of data obtained from a small diameter cupola (19 in. internal diameter) to cover a wide range in sizes. This extrapolation does not agree with data obtained in other experiments on the larger size cupolas. The melting rates in all latter cases are much higher for smaller oxygen additions.

3. Metal tapping temperatures are reported to be higher when oxygen is added to the cupola blast, the increases amounting to 100 F or more.

4. Generally speaking, metal composition is not affected by oxygen additions to the cupola blast, although some observers report that silica is reduced to silicon and absorbed by the molten metal[2]. In the case reported the silicon content of the metal at the spout was computed to be 0.32 per cent.

5. Reports regarding refractory losses are contradictory. In two cases large refractory losses have been observed[2,4]. In another, however, it is claimed that "By proper manipulation and use of oxygen enriched blasts, little refractory loss occurred . . ."[3]. Further research is necessary to clarify this phase of the problem as it appears, in the case of longer heats, that refractory loss can be minimized.

6. Loss of silicon by oxidation was reduced.

7. In the laboratory experiment[3] a considerable coke saving was obtained. Conditions ordinarily obtained with a 5:1 coke ratio when using air blast were duplicated with a 12:1 coke ratio when the blast was enriched to 28.9 to 29.9 per cent of oxygen.

8. Added cupola operating flexibility was obtained with the use of oxygen: (a) Better temperature and melting rate control. (b) Emergency use of oxygen to help clear up cold metal difficulties, bridging, slagged-over tuyeres, etc.

Tests that have been conducted for longer periods on a continuous basis indicate that:

1. A coke saving and/or increased melting rate can be obtained. With the blast containing 21.9 per cent of oxygen a coke saving of 37.5 lb per ton of iron was realized. No saving of coke was obtained when the blast contained 22.6 or 23.7 per cent of oxygen, but the melting rate was not increased with the 21.9 per cent oxygen blast. Melting rate increased 16.7 per cent with 22.6 per cent, and 20.0 per cent with 23.7 per cent of oxygen in the blast. The water content of all blast was below 2.9 grains per cubic foot in all cases.

2. Although there was a possibility of obtaining higher temperatures for a given coke ratio, the longer heats using oxygen enriched blast were run with the intent of obtaining normal spout temperatures by making other adjustments. This probably accounts for the coke saving in the one case and the increased melting rates in the other. A balance apparently exists between the two factors; namely, when coke is saved there is little or no increase in melting rate, and without a coke saving the opposite effect is noted.

3. Indications are that oxygen enrichment of the blast has an effect on chill depth. The extent of this effect has not been determined.

4. The chemical composition of the iron is not materially affected.

5. In these experiments it was found that increasing enrichment of the blast caused an increase in iron and manganese oxides in the slag.

6. Analysis of the effluent gas indicated better combustion within the cupola when oxygen was added to the blast.

7. Although the height of the melting zone was reduced, as indicated by the burnout, no excessive refractory loss was experienced. The cupola linings did not appear much different after 19 hr of operation with enriched blast than they did over the same period using only air blast.

It should be noted, however, that the oxygen content of the blast was below 23.7 per cent. The factor controlling refractory loss seems to be the rate of heat dissipation. After a particular rate is reached, the burnout is uniform and apparently smaller. Thus, the difference in lining burnout is negligible. Another factor to which this may be attributed is the maintenance of normal spout temperatures.

Nitrogen Volume Reduced

Addition of oxygen to the blast reduces the volume of inert gas (nitrogen) entering the cupola. Thus, enrichment permits a greater input of oxygen per unit time for the same volume. The cooling effect of the nitrogen at the tuyeres is reduced because less sensible heat is lost to the smaller quantities of nitrogen in the blast, and more active oxidation (combustion) begins at the tuyeres due to the larger volumes of oxygen entering the cupola.

With the greater input of oxygen, the combustion rate increases, i.e., more heat is available per unit of time. This heat can be utilized to increase the melting rate or the molten metal temperature, or both. The higher oxygen input per unit of time permits more complete combustion. Greater fuel economy should be realized since more heat results from a unit weight of fuel. The equations here are:

$$C + O_2 = CO_2 + 14{,}550 \text{ BTU/lb coke}$$
$$C + \tfrac{1}{2}O_2 = CO + 4{,}350 \text{ BTU/lb coke}$$

Increased heat intensity would mean greater refractory burnout. However, with low concentrations of oxygen and proper manipulation of charges this factor

should be controllable. This latter adjustment should prevent changes in the molten metal chemistry.

This appraisal seems to be substantiated by the data available. All experiments indicate an increase in melting rate and/or an increase in molten metal temperature. It appears that in larger cupolas small additions of oxygen give the same results as larger additions in smaller cupolas. The chemistry of the molten iron does not seem to be affected by oxygen enrichment. Better combustion conditions are obtained in all cases.

Assuming that oxygen is beneficial in cupola operation, let us consider its availability. At the present time sufficient manufacturing capacity is not available in the country to furnish oxygen in the quantities necessary for continuous use in any cupola or steel mill. The Johnstown, Penn., oxygen plant is the first to be used for large metallurgical operations in connection with the blast furnace. Oxygen in tank trailers is relatively expensive and, due to lack of manufacturing facilities, usually is not available in sufficient quantities at the time required.

Installation of small oxygen generators is a possibility, but skilled operators must be employed for operation and maintenance. The picture may change in the near future, but more research must be done to establish the most economical practices and the benefits that can be derived from the continuous use of oxygen enriched blast in the cupola.

Based upon the observations which have been reported up to the present time, the continuous use of oxygen enriched blast has not reached a stage of development where it can be recommended. Both because of the lack of sufficient available oxygen and the economics involved, considerable additional experimentation should be conducted before any wide-scale adoption of oxygen enriched blast in the cupola is initiated.

It does appear that oxygen enriched blast can be utilized successfully as a standby tool without extensive expenditure of money. When the cupola is operating irregularly, and the metal tapped is below normal temperature, or the tendency toward freeze-up is apparent, the introduction of the oxygen into the blast will assist in rapidly restoring the cupola to more nearly normal operation. In other words, oxygen enriched blast can be utilized as a satisfactory auxiliary tool even at the present price of oxygen.

References

1. F. Morawe, "Oxygen Enrichment of the Blast in Cupola Furnaces," *Giesserei*, vol. 17, pp. 132-36 and 155-67, 1930; and *Stahl und Eisen*, vol. 50, p. 452, 1930.

2. A. K. Higgins, "Oxygen Enrichment of the Cupola Blast," *Iron Age*, vol. 161, no. 17, April 22, 1948.

3. W. C. Wick, "Oxygen Enriched Cupola Blasts," American Foundrymen's Society TRANSACTIONS, vol. 56, p. 246 (1948); and "Cupola Operations Improved with Oxygen-Enriched Blast," AMERICAN FOUNDRYMAN, May, 1948.

4. J. A. Bowers, Discussion of Paper by W. C. Wick, "Oxygen Enriched Cupola," American Foundrymen's Society TRANSACTIONS, vol. 56, p. 258; (1948).

5. A. W. Gregg, "Oxygen and Cupola Operation," *The Foundry*, vol. 76, pp. 86-90, June, 1948.

CRYSTAL STRUCTURE IS CORROSION FACTOR

STUDY OF METAL SURFACES is now under way at the University of Virginia using single giant crystals to measure corrosion, friction and other properties of a single crystal face.

The crazy-quilt design of metal surfaces is a major factor in rusting, friction and other destructive processes which shorten the life of metal articles, according to the University's Professor Allan T. Gwathmey. This, he says, is because the different faces of a single crystal behave like entirely different metals, some rusting much more rapidly than others and some wearing out faster from friction. If "nature's careless arrangement can somehow be ordered so that each crystal put its best face forward," Professor Gwathmey states, "the usefulness of common metals might be increased."

Using colors as an indication of the thickness of the dark coating caused by oxygen on spheres cut from copper crystals, Virginia scientists calculated that some crystal faces corrode five times as rapidly as others.

Friction between two pieces of copper sliced from large crystals has been found to differ fourfold, depending on the crystal face exposed to the surface, and wear between lubricated metal parts varies both with the crystal face and with the nature of the gas that makes up the surrounding atmosphere.

Success in electroplating metal also depends to a large extent on which crystal face is exposed, Professor Gwathmey says.

"When copper is deposited electrolytically on a single crystal of copper from a copper sulfate-sulfuric acid solution at a current density of 2 milliamperes per square centimeter, the metal is deposited more rapidly on some faces than on others," he reports, "and the sphere is converted into a polyhedron at the end of 450 hours.

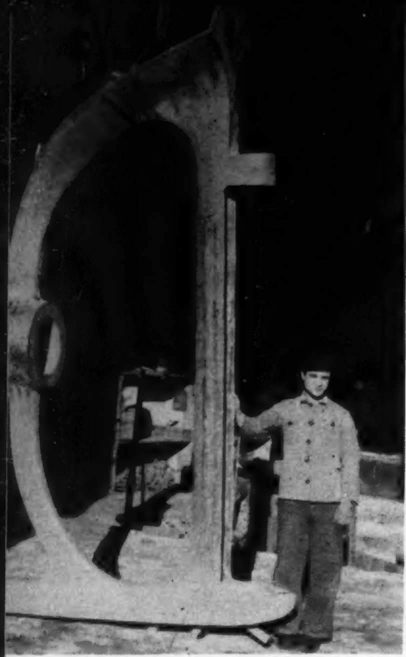
"In the case of corrosion or etching in liquids, one face will be more rapidly attacked than the other. Although this has long been known, surprisingly little consideration has been given this important effect in studies of corrosion."

Another interesting effect, according to Professor Gwathmey, is the preferred wetting of some faces of copper, nickel and iron by stearic acid when the crystals are immersed in the liquid and then raised above the level of the liquid and allowed to stand in the air for a few seconds. No such preferred wetting takes place when an atmosphere of hydrogen is maintained above the liquid, he says.

The University of Virginia experiments were revealed by Professor Gwathmey before the Rhode Island Section of the American Chemical Society.

5th of Chapter Attend Convention

AN UNOFFICIAL "NOSE COUNT" made by Sheldon P. Pufahl, Pufahl Foundries, Inc., a director of the A.F.S. Twin City Chapter, at the 1948 A.F.S. Convention in Philadelphia, revealed that one-fifth of the Chapter's entire membership travelled from the Minneapolis-St. Paul area to participate in the technical sessions and visit the exhibition of new foundry materials and equipment, according to *The Shakeout*, official organ of the A.F.S. Twin City Chapter.



CONTROLLED COOLING OF FERROUS CASTINGS

Emilio Infante Pedroso
Chief Engineer, Metallurgical Works
Companhia Uniao Fabril
Barreiro, Portugal

Fig. 1—Stern piece cast without hot tears through use of controlled cooling. This steel casting weighs 5000 lb.

INTERNAL STRESSES due to irregular cooling of castings in the mold have caused hot tears, cold cracks, and service failures familiar to all foundrymen. Failure in service of cast iron acid crucibles led the author to develop a foundry technique now applied to iron and steel castings to prevent failures and hot tears.

Since application of the new technique, large castings of widely varying section thickness have been successfully cast and put in use. The castings include various steel stern pieces for ships and cast iron acid crucibles. Since the technique is inexpensive and only requires equipment which is available in many foundries—thermocouples and a recording type potentiometer—the procedure may come into general usage, especially in steel foundries.

Hydrochloric acid crucibles cast in the author's plant are about four feet in diameter and were cracking in service, as shown diagrammatically in Fig. 2. Figure 6 shows the same crucible in cross section. Stress-strain curves and thermal expansion-contraction curves indicated that failure could not be caused alone by the heating and cooling of the crucibles in service. The tests showed that thermal stresses imposed in service would not exceed the elastic limit of the material (for practical purposes this may be considered as the ultimate strength of the cast iron).

The cause of cracking was determined to be the result of internal stresses caused by contraction in the mold of the hotter center of the casting when the periphery was already at room temperature. The thinner part of the casting is cold about 36 hours after pouring while the thicker part does not reach room temperature until after a cooling period of 76 hours.

The resulting locked-up stresses account for the bell-like sound made by the crucible when struck. The same type of stresses are the basis of the difficult art of bell making and are expressed empirically in the different thicknesses of a bell.

When an acid crucible is put into service, the stresses decrease in the early stages of heating but reappear as the temperature rises. Upon the addition of cold acid new internal stresses develop and reach a maximum about two hours after addition of the acid. The new stresses, a result of the periphery of the crucible being hotter than the center, act in the same directions as the stresses caused by cooling of non-uniform sections in the mold, and are frequently the cause of fracture in service.

To eliminate or minimize cooling stresses was of great interest since this would permit use of special irons of greater endurance than gray iron. On the other hand, as was afterwards seen in practice, cast iron having a high graphitic carbon content also has its advantages. In the case of the acid crucibles, we used a composition very near to the eutectic, thus permitting a low pouring temperature and a minimum liquid and solidification contraction.

During the first use of controlled cooling in the author's steel and iron foundries, temperatures of the various parts of a casting were determined visually.

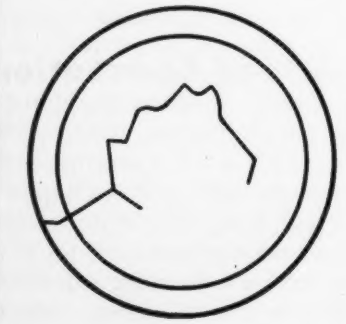
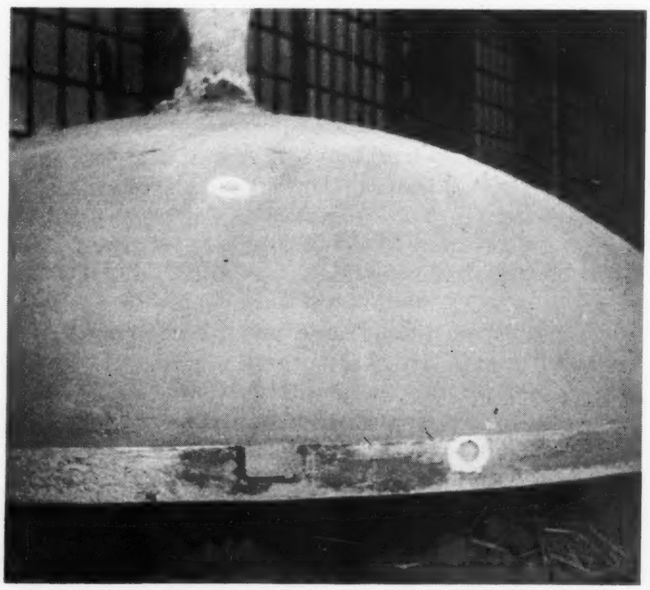


Fig 2.—Sketch of acid crucible shows how casting failed in service. General shape is shown in cross-sectional view, Fig. 6.



However, it was difficult to estimate the temperature in hidden parts of a casting and accuracy was seriously impaired due to variable light conditions. In addition, the need for acting with speed in cooling selected parts of a casting, especially steel, made visual estimation of the temperature most inefficient.

We therefore developed the method described below for the determination of the surface temperature at different points on a casting during the first five hours of cooling. The object was to maintain, by selective cooling, a uniform temperature in various parts of a casting, thereby avoiding excessive cooling stresses.

For the acid crucible, three chromel-alumel thermocouples were placed in the mold where they would be in contact with casting sections of different thickness, as shown in Figs. 3, 4, and 6. Fig. 5 shows the recorder which gives the "thermic diagram" of the casting. A typical "thermic diagram" is reproduced in Fig. 6.

Just after pouring there is little difference in temperature in the various sections of the casting although parts near the gates would naturally be hotter. Later, the heavier sections remain very noticeably hotter than the faster cooling thinner sections. As Fig. 6 shows, the curves of thermocouples 2 and 3 cut the curve of the thermocouple 1 between 1½ and 2 hours after pouring. Temperatures at 2 and 3 would have continued to rise, making the temperature differential and the stress greater, if rapid action had not been taken to balance the temperatures of the various sections.

The first acid crucible cast by the new method of controlled cooling stood up well in service even though made of an iron of higher thermal expansion than that of crucibles made previously which had failed.

The technique was then applied to complicated

Fig. 3 (left)—White circles on acid crucible casting show where two of the three thermocouples were in contact during solidification. Fig. 4 (below)—Cold junctions of two thermocouples protrude from the far side of the acid crucible mold. Fig. 5 (right)—A standard multiple point recording potentiometer is set up next to the mold to follow cooling of various parts of the casting and record the thermic diagram.

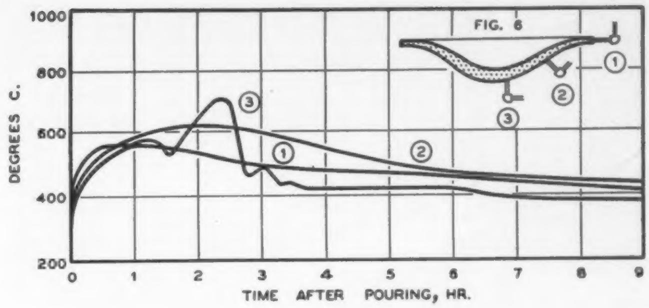


Fig. 6—Cooling curves show temperature variations at the three points designated in the cross-sectional sketch.

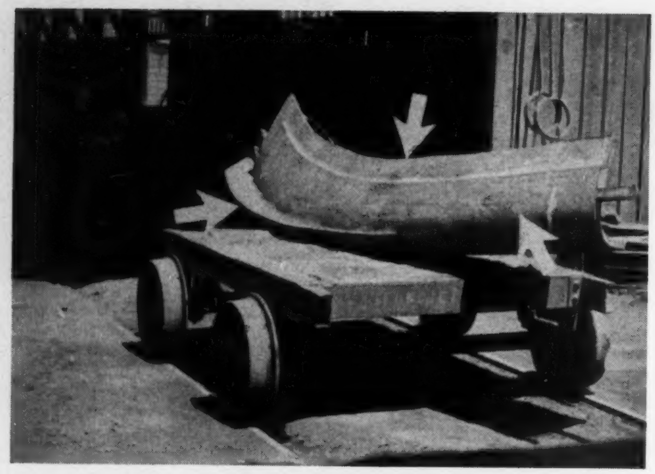
steel castings, particularly those of alloys having high contraction and low elongation at elevated temperatures. From the beginning we succeeded in eliminating all hot tears, which until then had been impossible.

Thermocouple Procedure Established

Three noble-metal thermocouples were used to measure the temperatures during cooling of three points on the steel stern piece shown in Fig. 7. After establishing a procedure on the first piece all subsequent castings of the same type were treated in the same way. In addition to the 3000 lb steel casting in Fig. 7, stern pieces weighing 9000 and 5000 lb, and wire annealing pots weighing 3000 lb have been successfully cast. The 5000 lb casting (Fig. 1) required five thermocouples; the 9000 lb casting required six.

Compressed air and water are used in controlled cooling of the heavy sections of castings. Usually, compressed air is employed only on small castings. In most cases, water is used directly over the section to be cooled, the water being applied by hose or bucket. Water spraying does not give satisfactory results as the water vaporizes before touching the work. A greater quantity of water must be used in the spray method, without any practical advantage.

In controlling cooling, it is the usual practice to remove part of the mold as soon as possible in order to clear the part of the piece to be cooled. The amount



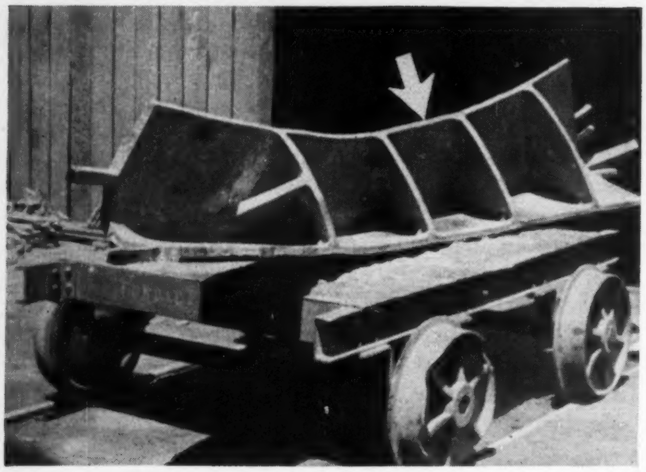


Fig. 7—Thermocouples located at the points indicated by arrows gave information with which it was possible to produce this steel casting without hot tearing.

of water to be used is determined approximately by the heat transfer equation:

$$W = \frac{V \cdot S \cdot Cs \cdot \triangle T}{h}$$

where

W=volume of water to be poured over the part considered (decimeter^3)

V=volume of part to be cooled (decimeter^3)

S=specific weight (Kg/decimeter^3)

Cs=specific heat of steel or cast iron at the temperature assumed (cal/Kg)

$\triangle$T=Difference in temperature recorded on thermic diagram (°C)

h=specific latent heat of vaporation (Mollier or other steam tables) (cal/Kg)

In the foregoing equation some values of small importance have been omitted. Furthermore, if the temperature indications of the pyrometers are carefully followed, it is possible to keep an even temperature distribution in all parts of the casting by applying the water with a hose, thus eliminating the water determination necessary when a bucket is used.

In a large casting, such as the acid crucible shown in Figs. 3 and 4, the author has employed a water hose, playing the stream partly over the casting and partly over the sand until the pyrometer readings closely approach one another. After the procedure was established, good results were obtained with this method.

Water pipes, entirely enclosed in the sand mold, were used for cooling a large steel casting, a ship's stern piece. The water pipes were perforated near the heavy sections of the casting. It was necessary to perforate the pipes because circulation of the water inside the pipe is not sufficient to effect necessary cooling.

The stern piece was in perfect condition when taken from the sand and, due to the action of the water, required little cleaning. The casting is now in service on a special codfisher operating in Northern waters.

At present the foundry is making a series of rollers for a cement mill. Before the controlled cooling method was developed several failures occurred with this type of casting. Now a predetermined amount of water is poured from a bucket to equalize by heat transfer the temperatures of various casting sections. These roll castings are annealed because the kind of metal used requires this treatment, but not on account of internal stresses due to unequal cooling rates.

Future Meetings and Exhibits

MATERIALS HANDLING EXPOSITION, Philadelphia—Jan. 10-14.

MALLEABLE FOUNDERS' SOCIETY, semi-annual meeting, Hotel Cleveland, Cleveland—Jan. 14.

INDUSTRIAL FURNACE MANUFACTURERS ASSOCIATION, meeting, Cleveland—Jan. 24-25.

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS, annual meeting, Chicago—Jan. 24-28.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, winter general meeting, Hotel Pennsylvania, New York—Jan. 31-Feb. 4.

STEEL FOUNDERS' SOCIETY OF AMERICA, annual meeting, Chicago—Feb. 9-10.

WISCONSIN REGIONAL FOUNDRY CONFERENCE, A. F. S. Wisconsin Chapter, Milwaukee—Feb. 10-11.

ASSOCIATION OF AMERICAN STATE GEOLOGISTS, San Francisco—Feb. 11-12.

IRON AND STEEL AND INSTITUTE OF METALS DIVISIONS, American Institute of Mining and Metallurgical Engineers, annual meeting, San Francisco—Feb. 13-17.

AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS, annual meeting, San Francisco—Feb. 14-17.

BIRMINGHAM REGIONAL FOUNDRY CONFERENCE, A.F.S. Birmingham District Chapter, Birmingham, Ala.—Feb. 17-19.

MALLEABLE FOUNDERS' SOCIETY, western sectional meeting, Palmer House, Chicago—Feb. 25.

AMERICAN SOCIETY FOR TESTING MATERIALS, spring meeting and committee work, Edgewater Beach Hotel, Chicago—Feb. 28-Mar. 4.

MALLEABLE FOUNDERS' SOCIETY, eastern sectional meeting, New York—Mar. 4.

OHIO REGIONAL FOUNDRY CONFERENCE, A.F.S. Ohio Chapters, Ohio State University, Columbus—Mar. 11-12.

MALLEABLE FOUNDERS' SOCIETY, western sectional meeting, Palmer House, Chicago—Mar. 25.

ANNUAL SAFETY CONVENTION AND EXPOSITION, Hotel Pennsylvania, New York—Mar. 29-April 1.

AMERICAN SOCIETY FOR METALS, Sixth Western Metal Congress and Western Metal Exposition, Shrine Auditorium, Los Angeles—April 11-15.

AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS, National Open Hearth Steel Committee, annual meeting, Palmer House, Chicago—April 18-20.

MALLEABLE FOUNDERS' SOCIETY, western sectional meeting, Palmer House, Chicago—April 22.

American Foundrymen's Society, 53rd Annual Foundry Congress, St. Louis—May 2-5.

WHO'S WHO

E. I. Pedroso

Emilio Pedroso (*"Controlled Cooling of Ferrous Castings"*, Page 60) is chief engineer of Portugal's Metallurgical Barreiro Works of the Companhia Uniao Fabril . . . Received degree of Hydraulical Engineer from the University of Grenoble, France, in 1936 . . . Joined Fabricas Vulcano e Colares, Lisbon, as engineer in 1936, becoming a director of that company in 1939 . . . When the company was purchased by Companhia Uniao Fabril in 1945, Mr. Pedroso became chief engineer, his present position. He is a member of A.F.S. and Portugal's Ordem des Engenheiros.

Frank Wallace

Frank Wallace, author of *"Creating Cost Consciousness"*, Page 48, is a principal in the firm of McKinsey & Co., management consultants . . . Holds degrees in Business from Rice Institute and Harvard University Graduate School of Business . . . Was a certified public accountant with Peat, Marwick, Mitchell & Co., Kansas City, Mo., and Washington, D. C. accounting firm from 1935 to 1940, when he joined McKinsey in his present capacity . . . Has spoken before many national and international meetings of industrial organizations and has written several articles on cost controls for the trade press. . . Is currently working on chapters for two accounting handbooks to be published next year.

I. W. Burr

Irving W. Burr, author of *"Quality Control Methods Brought Down to Earth"*, Page 43, is associate professor of mathematics at Purdue University, where his paper on this useful interesting method of quality control was an outstanding feature of the regional conference held there early this month (See Pages 26-30) . . . Holder of a B.S. from Antioch College (1930), M.S. from the University of Chicago (1935) and a Ph. D. from the University of Michigan (1941) . . . Began teaching mathematics at Antioch College in 1930, left there in 1941 to accept his present associate professorship at Purdue . . . Served with the Office of Production Research and Development in 1945 and taught Quality Control Training at Republic Steel Corp. this year . . . Has spoken before several technical societies on quality control, and has written for the technical press on the subject . . . A member of several mathematical societies, Dr. Burr was formerly technical advisor to ASTM committees and is a member of the Editorial Board of the American Society for Quality Control.

C. A. Sanders

Clyde A. Sanders (*"Wood Flour Additions Aid in Foundry Sand Control"*, Page 50) is one of the foundry industry's most popular speakers and a prolific writer on the subject of foundry sands . . . A graduate of Ohio State University, where he collaborated with Ohio State Geologist Wilbur Stout on the development of Ohio clays, he joined the Lawrence Clay Co. shortly afterwards . . . Went to work for American Colloid Co., Chicago, in 1941, leaving that year to accept a commission in the Navy, where he studied rocket warfare and saw active service in both the Atlantic and Pacific theaters . . . Is now engineer with American Colloid.

A. D. Brandt

Allen D. Brandt, author of *"Adequate Dust Control Keeps Foundry Clean"*, Page 35, is industrial hygiene engineer for the Bethlehem Steel Co. . . . Holds a B.S. in Civil Engineering from Pennsylvania State College (1931) . . . M.S. and D.Sc. in Sanitary Engineering from Harvard University . . . Was chief of the Engineering Section, Industrial Hygiene Division of the U. S. Public Health Service from 1940 to 1942, when he was loaned to the Army for the duration of World War II . . . After the war was USPHS Research Fellow, assigned to the American Society of Heating & Ventilating Engineers Research Laboratory, Pittsburgh . . . Joined Bethlehem Steel in 1946 . . . Has made some 30 talks and written an equal number of technical papers on industrial ventilation and atmospheric sanitation during the last five years and has authored *Industrial Health Engineering*, published last year by John Wiley & Sons.

Milton Sherman

Milton Sherman, author of *"Iron in Brass and Bronze—Rapid Colorimetric Determination"*, Page 55, is chief chemist for Silverstein & Pinsoff, Inc., Chicago . . . A graduate of the Illinois Institute of Technology with a B.S. in Chemical Engineering in 1942, he became associated with the Pittsburgh Testing Laboratory as a chemist upon graduation . . . Became chief chemist there in 1944-45 before joining Silverstein & Pinsoff in the same capacity . . . Has written papers for the American Association for the Advancement of Science on non-ferrous alloy analysis and authored *"Sulphur Determination"* in the March, 1948, issue of AMERICAN FOUNDRYMAN.

Alabama Allied With FEF

SEVENTH SCHOOL to coordinate its foundry program with the Foundry Educational Foundation, the University of Alabama at Tuscaloosa formally allied itself with FEF on October 15. The foundry program to be set up will be actively directed by Professor E. C. Wright, head of the department of metallurgical engineering. Chairman of the Alabama Advisory Committee for FEF is Dr. James T. MacKenzie, American Cast Iron Pipe Co., Birmingham, who is chairman of the A. F. S. Birmingham District Chapter.

Details of Alabama affiliation with FEF will appear in the January, 1949, AMERICAN FOUNDRYMAN.

FEMA HOLDS ANNUAL MEETING

Broadens Scope Of Activities, Elects Officers For '49

INDUSTRIAL MOBILIZATION in the event of war was the keynote of the 30th Annual Meeting of the Foundry Equipment Manufacturers Association, Inc., held at the Greenbrier, White Sulphur Springs, W. Va., October 14-16. More than a hundred manufacturing executives attended for 43 member companies.

The role of the foundry equipment manufacturer in providing production tools for one of America's most vital defense industries, the foundry, was outlined by A. F. S. Past National President Lee C. Wilson, consultant on Foundry Equipment and Supplies for the National Security Resources Board, Washington.

Opening day of the session was devoted largely to policy group and directorial meetings, beginning with a get-together of the Product Group Policy Committee, which discussed the immediate possibilities open to various product groups.

During the noon luncheon, chairmen of the various groups reported on their activities for the year and discussed plans for broadening their scope and effectiveness during the coming year. Also present at this meeting were FEMA directors, Director-Nominees F. W. Klatt, W. W. Sly Mfg. Co., Cleveland, C. V. Nass, Beardsley & Piper Co., Chicago, and Claude B. Schneible, Claude B. Schneible Co., Detroit. Others present by special request were A. F. S. National President W. B. Wallis; Howard Coonley, chairman of the Executive Committee of the American Standards Association; and F. G. Steinebach, chairman, Munitions Board of the Armed Services Foundry Industry Advisory Committee, which was recently formed.

FEMA To Join Standards Association

It was decided by the Board of Directors that the FEMA will take a membership in the American Standards Association for 1949, to determine the value of a permanent connection with that organization.

The actual meeting of the membership began the morning of October 15, when FEMA President Otto A. Pfaff, president, American Wheelabrator & Equipment Corp., outlined the fundamental problems confronting foundry equipment manufacturers and cited the steps to overcome them.

Vice-President W. L. Dean, Membership committee chairman, presented the following new FEMA members: John H. Tressler, resident manager, Hickman, Williams & Co., Cleveland; Richard A. Brackett, vice-president, The Spencer Turbine Co., Hartford, Conn.; and George F. Begoon, vice-president in charge of Sales, The Thermix Corp., Greenwich, Conn.

The general trend of sales of foundry equipment is higher this year than in 1947, according to reports delivered by representatives from each member company present—an interesting annual feature of the meeting. Sixteen companies reported that their trend of sales has been upward over 1947, 13 said "about the same," while only 6 reported a falling-off in business.

E. A. Borch, chairman of the Statistical Committee, reported progress in setting up an improved Monthly Index of Foundry Equipment Orders and described results achieved from changes in monthly reports providing for the inclusion of the dollar information desired by many members. Mr. Borch told what contributors could expect from this broadened activity.

President Pfaff cited FEMA By-Laws provisions for the naming of a Nominating Committee to select Director candidates. The Committee consisted of C. F. Scherer, Davenport Machine & Foundry Co.; G. B. Comfort, Schram, Inc.; E. A. Frey, Industrial Equipment Co.; S. S. Parsons, Parsons Engineering Corp.; and V. F. Stine, Pangborn Corp.

Elects 1949 Officers, Directors

The Committee nominated three directors— F. W. Klatt, W. W. Sly Mfg. Co.; C. V. Nass, Beardsley & Piper Co.; and Claude B. Schneible, Claude B. Schneible Co. In the absence of the receipt of any other nominees, these men were elected to three-year terms.

President Pfaff presided at the Annual Dinner, held Friday evening. Harry G. Schlichter, Beardsley & Piper Co., Chicago, filled in for Annual Meeting Committee Chairman Leon F. Miller, Osborn Mfg. Co., Cleveland, as master of ceremonies.

At the Board of Directors meeting on Saturday morning, October 16, the following officers were elected for 1948-49: president, W. L. Dean, Mathews Conveyor Co.; vice-president, John Hellstrom, American Air Filter Co., Inc.; executive secretary and treasurer, Arthur J. Tuscany, Arthur J. Tuscany Organization.

It was announced that, at the expiration of President Pfaff's term, President Dean and Vice-President Hellstrom would take over as FEMA representatives on the National Castings Council, and that Bruce L. Simpson, National Engineering Co., and Charles A. Barnett, Foundry Equipment Co., would continue to represent FEMA in the FEF.

A. F. S. National President W. B. Wallis, president of a member company of FEMA, thanked President Pfaff for his cooperation with A.F.S. during his term of office, both from a personal and association standpoint, and thanked FEMA members for their help in making the 1948 A.F.S. Foundry Congress a success.

Frank G. Steinebach, secretary of the National Castings Council, described NCC's methods of handling representation from outstanding groups in the foundry industry, and set forth NCC's policies.

Charles A. Barnett, secretary-treasurer of the Foundry Educational Foundation, detailed FEF objectives and explained how provisions were made for educating foundry engineering candidates in six outstanding engineering schools.

Speaking on the Foundry Industry Advisory Committee, FEMA Past President Thomas Kaveny, Jr., described events leading to its organization, and gave a list of its members (AMERICAN FOUNDRYMAN, Septem-

ber 1948, page 33). Because of his excellent record in this connection, it was announced that Mr. Kaveny will continue to represent FEMA on the Committee.

Lester B. Knight, Lester B. Knight & Associates, Chicago, reported on his visit to the International Foundry Congress at Prague, Czechoslovakia, where he was official representative of the American Foundrymen's Society. Mr. Knight gave his views on conditions in several European countries visited during his trip.

Non-Ferrous Society Elects Officers

ELECTION OF 1948-49 OFFICERS AND DIRECTORS of the Non-Ferrous Founders' Society was announced at the Society's Annual Meeting, held October 22 in Philadelphia. They are:

President, Fred Haack, Jr., Capital Brass & Aluminum Foundry, Chicago; first vice-president, Walter M. Clark, D. W. Clark & Co., South Boston, Mass.; and second vice-president, J. D. Zaiser, Ampco Metal, Inc., Milwaukee.

Directors elected for three-year terms are: Roy C. Wendelbo, DeSanno Foundry & Machine Co., Oakland, Calif.; E. T. Korten, Reliable Castings Co., Cincinnati; and A. L. Goodreau, G B Foundry Co., Los Angeles.

Committee chairman appointments for the coming year included: Cost, William A. Gluntz, The Gluntz Brass & Aluminum Co., Cleveland; Industrial Relations, George B. Hazen, Brass Foundry Co., Peoria, Ill.; Chapter Activities, Walter M. Clark, D. W. Clark & Co., South Boston, Mass. (Society first vice-president); and Membership, J. D. Zaiser, Ampco Metal, Inc., Milwaukee (second vice-president).

NATIONAL FOUNDERS' ASSOCIATION CONVENES

"PRODUCTION FOR BETTER LIVING" was the theme of the 50th Annual Meeting of the National Founders' Association, held November 17, 18 and 19 at the Sheraton hotel, Chicago, and attended by more than 200 foundry executives.

A special feature of the three-day meeting was a dinner held in honor of the NFA's founding members, represented by L. R. Clausen, for the J. I. Case Co., Racine, Wis.; Franklin R. Hoadley, for the Farrel-Birmingham Co., Inc., Ansonia, Conn.; Thomas S. Hammond, for the Whiting Corp., Harvey, Ill., and F. S. Mackey, for the Allis-Chalmers Manufacturing Co., Milwaukee. During the sessions the following day, E. C. Hoenicke of the Eaton Manufacturing Co., Vassar, Mich., paid tribute to the founding members.

Executive officers of the National Founders' Association for 1948-49 are, left to right: Harry Ladwig, Allis-Chalmers Mfg. Co., vice-president; Franklin Farrel, III, Farrel-Birmingham Co., president; and Leroy E. Roark, executive vice-president of the Association.

The November 18 sessions opened with an address by Kenneth Wells, director of the Joint Advertising Council, who spoke on the *"Miracle of America"*, in which he compared American living standards and industry with that of the rest of the world.

Following Mr. Wells' address, Roger Bronson of Bronson, Dennehy, Ulseth, Inc., spoke on *"Planned Safety and Health in the Foundry"*, in which he stressed the need for planning and cooperation in developing safety measures, rather than reliance on safety devices alone.

An inspiring talk was made by Lewis E. Wass, director of Industrial and Adult Education for the City of Davenport, Ia., who spoke on *"A Vocational Training Director Talks Back."* Mr. Wass cited the "white collar complex" and the need for young people to "do something with their hands." He pointed out that one of the best places for this is the foundry. He recommended that founders "Tell the romance of flowing metal. Point out that the foundry is the backbone of all industry—for everything manufactured is dependent on the foundry at some time. Describe the hundreds of jobs performed daily, deemed 'distasteful' by many, such as work in a packing house, or that performed by professional men such as doctors and dentists and which is not always desirable."

George W. Cannon of Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., a member of the Munitions Board, introduced the Board's chairman, Donald Carpenter, who made an impromptu address on the workings of the Board.

Other speakers at the three-day convention were I. R. Wagner, president of the National Founders Association; C. S. Carney, engineer, Stevens, Jordan and Harrison; Hon. Gerald W. Landis, M. C.; Lee C. Shaw, attorney, Seyforth, Shaw and Fairweather; Phil Hanna, business editor of the *Chicago Daily News;* William B. Ziegelmueller of the Electric Steel Castings Co., Indianapolis; and G. A. Kastner of the Lincoln Brass Works, Inc., Detroit.

Election of officers was held during the meeting and the results announced at the close of Friday's session. Franklin Farrel, III, of Farrel-Birmingham Co., Ansonia, Conn., was elected president, and Harry Ladwig, Allis-Chalmers Manufacturing Co., Milwaukee, was named vice-president for the coming year. Both Mr. Farrel and Mr. Ladwig have taken a prominent part in furthering the interests of the foundry industry.

Concluding the meeting, L. E. Roark, Association executive vice-president, reported that the Administrative Council has approved plans for increased Association activities during 1949.

New AFS MEMBERS

Period October 15 - November 15: Conversions to larger memberships and to new sustaining and company memberships continued to increase as A. F. S. added 197 members. Leading chapters of 38 showing gains were: Northeastern Ohio, 17; Tennessee, 14; Texas, 13; Central Ohio, 11; Chicago, 11; Northern California, 10; and MIT, 10.

CONVERSIONS

Company to Sustaining

Toronto Fdy. Co. Ltd, Ont.—George R. Winkworth, Pres. (Ontario Chapter).

Personal to Company

King Foundry Inc., Minneapolis—Lloyd H. King, Pres. (Twin City Chapter).

NEW SUSTAINING MEMBERS

Vulcan Steel Foundry Co., Oakland, Calif.—James L. Francis, Mgr., (Northern California Chapter).

NEW COMPANY MEMBERS

United States Stove Co., So. Pittsburg, Tenn.—H. E. Copeland, Prod. Mgr., (Tennessee Chapter).
Victoria Fdy. Co., Ottawa, Ont.—Harry Murray, Fdy. Supt., (Eastern Canada & Newfoundland Chapter).

CENTRAL INDIANA CHAPTER

Carson K. Hitz, Sls. Repr., Mich. Smelt. & Refining Co., Fishers, Ind.

CENTRAL MICHIGAN CHAPTER

W. P. Schafer, Fdy. Supt., Novo Engine Co., Lansing, Mich.
Grover E. Tourville, Supt. of Maintenance, Albion Malleable Iron Co., Albion, Mich.

CENTRAL NEW YORK CHAPTER

Robert E. Grossman, Prog. Student Fdy., International Harvester Co., Auburn, N.Y.

CENTRAL OHIO CHAPTER

Wayne R. Carney, Lab. Asst. Res. Tech., Battelle Memorial Institute, Columbus, Ohio.
Dillon Clay, Gen. C/R Fmn., Ohio Fdy. Co., Springfield, Ohio.
James A. Davis, Research Engr., Battelle Memorial Institute, Columbus, Ohio.
Harold Hawk, Melting Fmn., Steel Fdy. Co., Springfield, Ohio.
W. G. N. Heer, Research Engr., Battelle Memorial Institute, Columbus, Ohio.
Gerald Kirkpatrick, Gen. Fmn., Ohio Steel Fdy Co., Springfield Ohio.
Frank B. Reynolds, Prod. Mgr., Miller Fdy. Co., Columbus, Ohio.
Charles Evan Rowe, Research Tech., Battelle Memorial Institute, Columbus, Ohio.
Robert N. Savage, Asst. Off. Mgr., Miller Fdy. Co., Columbus, Ohio.
Clyde R. Tipton, Jr., Res. Engr., Battelle Memorial Institute, Columbus, Ohio.
George M. Ullom, Dist. Sls. Mgr., Harbison Walker Refractories Co., Pittsburgh.

CHESAPEAKE CHAPTER

Harry C. Barnett, Met., National Bureau of Standards, Washington, D. C.
W. J. Croft, Pres., Ajax Alloy Fdy., Baltimore, Md.
Leroy Edward Groh, Partner, Central Pattern Works, Baltimore, Md.
J. C. Keith, Secy.-Treas. & Mgr., White Fdy. Co., Inc., Roanoke, Va.
August F. K. Kraeter, Pres., American Alloy Fdy., Baltimore, Md.
Frank C. Lewis, Owner, Frank C. Lewis, Baltimore, Md.

CHICAGO CHAPTER

E. R. Bellows, Fmn., Continental Fdy. & Mach. Co., Munster, Ind.
Robert Ciner, Asst., Finish. Supt., National Mall. & Steel Cast. Co., Cicero, Ill.
Adrian C. Den Breejen, Fdy. Supt., Nichol-Straight Fdy. Co., Chicago.
Leo Friedman, Met., National Mall. & Steel Cast. Co., Cicero, Ill.
J. W. Kelin, Sls. Mgr., Federated Metals Div., American Smelting & Refining Co., Whiting, Ind.
Harry Knox, Owner, Knox Welding & Machine Shop., Waynesboro, Pa.
Fred A. Lennertz, Fmn. Inspection Dept., Continental Fdy. & Mach. Co., Hammond, Ind.
August Lossin, Finish. Supt., National Mall. & Steel Cast. Co., Cicero, Ill.
Howard A. Robinson, Mold. Fmn., Carnegie-Illinois Steel Corp., Chicago.
George Sliwinski, Asst. Fdy. Supt., National Mall. & Steel Cast., Cicero.
Edwin Arthur Swensson, Sls. Engr., Palmer-Bee Co., Chicago

CINCINNATI DISTRICT CHAPTER

William R. Hiatt, Student, University of Cincinnati, Wilmington, Ohio.
Henry F. Pettit, Gen. Supt. G.H.R. Fdy. Div., Dayton Mall. Iron Co., Brookville, Ohio.
Fred E. Westermann, Inst. in Met., University of Cincinnati, Cincinnati.
Lawrence C. Yeardley, Student, University of Cincinnati, Cincinnati.

DETROIT CHAPTER

Peter J. Petho, Jr., Fmn., Ford Motor Co., Detroit.
Paul B. Smith., Vice-Pres., Northern Cast Alloy, Inc., Detroit.
E. George Wanamaker, Pres., Northern Cast Alloy, Inc., Detroit.

EASTERN CANADA & NEWFOUNDLAND CHAPTER

**Victoria Foundry Co., Ltd., Ottawa, Ont. (Harry Murray, Fdy. Supt.).*
Robert Lyle, Salesman, Canada Iron Foundries, Ltd., Montreal, Que.

EASTERN NEW YORK CHAPTER

C. P. Crotty, Sls. Repr., Nassau Smelting & Refining Co., Rosedale, N. Y.
Chester J. Kehn, Fmn., Meneely Bell Co., N. Y.
James Taylor, Engr. of Tests, American Locomotive Co., Schenectady, N. Y.
Glenn H. Wells, Supv. of Heat Treating Dept., American Locomotive Co., Schenectady, N. Y.

METROPOLITAN CHAPTER

Thomas J. Campbell, Fmn., Singer Mfg. Co., Bayonne, N. J.
Harry F. Heffner, Fdy. Consultant, Arlington, N. J.

MICHIANA CHAPTER

John F. Foster, Supt., Tool & Pattn. Div., Weil McLain Co., Michigan City, Ind.

NORTHEASTERN OHIO CHAPTER

John G. Balsay, Fmn., Superior Fdy. Inc., Cleveland.
Stanley Ciurka, Fmn., Superior Fdy. Inc., Cleveland.
John Gawel, Fmn., Superior Fdy. Inc., Cleveland.
Ralph C. Hunter, Slsmn., Johnson Firebrick Co., Cleveland.
John Jaworski, Mold. Fmn., Superior Fdy. Inc., Cleveland.
George A. Meyer, Shop Practice Engr., Malleable Founder's Society, Cleveland.
George Montowski, Core Fmn., Superior Fdy. Inc., Cleveland.
William J. Parana, Student, Case Institute of Technology, Erie, Pa.
Edward Petrick, Fdy. Fmn., Superior Fdy. Inc., Cleveland.
Chester Sickels, Mold. Fmn., Superior Fdy. Inc., Cleveland.
J. P. Solomonson., Indus. Engr., Superior Fdy. Inc., Lakewood, Ohio.
Thomas S. Steffens, Prod. Control Mgr., Superior Foundry Inc., Cleveland.
James Stoffl, Core Fmn., Superior Fdy. Inc., Cleveland.
Robert J. Unger, Student, Case Inst. of Tech., Westlake, Ohio.
Joseph Wisniewski, Grinding Fmn., Superior Fdy. Inc., Cleveland.
Ray H. Witt, Met. App., Case Institute of Tech., Cleveland.
Joe Zelonis, Molding Fmn., The Fanner Mfg. Co., Berea, Ohio.

NORTHERN CALIFORNIA CHAPTER

Dan Ambulia, Asst. Supt., Pacific Steel Casting Co., Berkeley, Calif.
Joseph Cannata, Melter, Pacific Steel Casting Co., Berkeley, Calif.
Worth Cropp, Jr., App., Pacific Brass Fdy. of S. F., Oakland, Calif.
John De Martini, Cln. Rm. Fmn., Pacific Steel Casting Co., Berkeley, Calif.
***Vulcan Steel Foundry Co., Oakland, Calif., (James L. Francis, Mgr.).*
Alvin J. Karger, Gen. Fmn., Vulcan Steel Fdy., Oakland, Calif.
Gordon L. Martin, App., Atlas Fdy. & Mfg. Co., Richmond, Calif.
Herbert K. Powell, App., Pacific Brass Fdy. of S. F., San Fransisco
Tom Sawyer, Sls. Engr., E. J. Bartells Co. of Calif., San Fransisco
Ernest Silva, Master Mech., Pacific Steel Casting Co., Berkeley, Calif.

NO. ILLINOIS & SO. WISCONSIN CHAPTER

John Reynolds, Molding Supv., Geo. D. Roper Corp., Belvidere, Ill.

NORTHWESTERN PENNSYLVANIA CHAPTER

William Clark, Griswold Mfg. Co., Erie, Pa.
David Dale, Pattn. Shop Fmn., Griswold Mfg. Co., Erie, Pa.
Harold L. Douglas, App. Mold.,
National Transit Pump & Mach. Co., Oil City, Pa.
Fredolph B. Johnson, App.,
National Transit Pump & Mach. Co., Oil City, Pa.
W. F. Lierman, Supt., Cascade-Paradine Mfg. Co., Erie, Pa.
Russell Norrell, Griswold Mfg. Co., Erie, Pa.

OREGON CHAPTER

Theodore H. Gray, Cons. Met. Engr.,
Metallurgical Engineers Inc., Portland, Ore.
Wm. B. Jonasson, Insp., Electrical Steel Fdy., Portland, Ore.

PHILADELPHIA CHAPTER

Lester E. Chanudy, Jr., Vice-Pres.,
National Precision Casting Corp., Clifton Heights, Pa.
John R. Dunlap, Chf. Insp., Crucible Steel Casting Co., Lansdowne, Pa.
George S. Gordon, Palmyra Fdy. Co., Edgewater Park, N. J.
Henry J. Kelly, Dodge Steel Company, Philadelphia.
Scott B. Ritchie, Asst. to V.P. in Charge of Opr.,
U. S. Pipe & Fdy. Co., Burlington, N. J.
Bentley C. Titus, Core Maker, Fletcher Works, Philadelphia.

ROCHESTER CHAPTER

Leonard L. Nickel, Core Maker,
American Laundry Machinery Co., Rochester, N. Y.

SAGINAW VALLEY CHAPTER

M. A. Varney, National Carbon Co., Inc., Dearborn, Mich.

ST. LOUIS DISTRICT CHAPTER

Edward R. Belton, Partner, Progressive Pattn. Co., St. Louis.
J. L. Gordon, Dist. Mgr., Luria Brothers & Co., Inc., St. Louis.
Herbert E. Gundelfinger, M. A. Bell Co., St. Louis.
Morris Lefton, Partner, B. Lefton & Sons Iron & Metal Co., St. Louis.

SOUTHERN CALIFORNIA CHAPTER

Gordon Coutts, App., Mold. Dept., Reliance Regulator Corp., Los Angeles.
Joseph J. Democh, Fmn., Westlectric Castings Inc., Montebello, Calif.
J. T. Evans, Jr., Fdy. Met., National Supply Co., Torrance, Calif.
Otis Garth, Ref. Dept. Mgr., L. H. Butcher Co., Los Angeles.
John Haydon, Fmn. of C/R, Reliance Regulator Corp., Alhambra, Calif.
Louis F. Luther, Supv., National Supply Co., Los Angeles.
W. E. Walton, Columbia Steel Co., Torrance, Calif.
A. C. Willoughby, Supv., National Supply Co., Hawthorne, Calif.

TENNESSEE CHAPTER

Lewis B. Bearden, Chemist, Ross-Meehan Foundries, Chattanooga.
**United States Stove Co., So. Pittsburg, Tenn., (H. E. Copeland, Prod. Mgr.).*
Sandmann Davies, Sales Training, Ross-Meehan Fdys., Chattanooga.
Vernon C. Eason, Jr., Sls. Repr., The Hines Flask Co., Chattanooga.
Chas. Kelley, Asst. Fmn., Boiler Fdy., Crane Co., Rossville, Georgia.
Dewey A. Kirk, Supv., Somerville Iron Works, Chattanooga.
F. J. Perkinson, Fdy. Fmn.,
Combustion Engineering Co., Inc., Chattanooga.
Jack Reese, Salesman, E. F. Houghton & Co., Chattanooga.
A. Arley Ridner, Maint. Fmn., Harrison-Corry Co., Knoxville, Tenn.
E. W. Robbs, Jr., Insp., Ross-Meehan Fdries., Chattanooga.
John Lloyd Smelcer, Owner, Warrensburg Foundry, Midway, Tenn..
Edwin S. Williams, Sls. Engr., Ingersoll-Rand Co., Signal Mountain, Tenn.
Howard Wilson, Somerville Iron Works, Chattanooga.
Harvey B. Wingo, Supv., Somerville Iron Works, Chattanooga.

TEXAS CHAPTER

Wilbur A. Bittell, Salesman,
Royall Fire Brick & Supply Co., Houston, Texas.
Clarence L. Brock, Jr., Off. Mgr.,
Southwest Fdy. Supply Co., Houston, Texas.
Vernon G. Brock, Pres., Southwest Fdy. Supply Co., Houston, Texas.
H. N. Cedergren, Owner, Cedergren Metals Co., Dallas, Texas.
Sam J. Chojnacki, Fmn., Brass & Aluminum Fdy.,
Alamo Iron Works, San Antonio, Texas.
Wm. W. Dyer, Owner, Trinity Brass & Copper Co., Dallas, Texas.
G. Byron Keith, Salesman, Royall Fire Brick & Supply Co., Houston, Texas.
L. M. Kniffin, V. P. & Gen. Mgr.,
Valencia Iron & Chemical Corp., Rusk, Texas.
Wilbur A. Kuehne, Fmn. Ptn. Shop,
Alamo Iron Works, San Antonio, Texas.
Edward W. Pruske, Fdy. Fmn., Alamo Iron Works, San Antonio, Texas.
Henry E. Radack, Methods Engr., Reed Roller Bit Co., Houston, Texas.
A. C. Raymos, Owner, Texas Bronze Mfg. Co., Ft. Worth, Texas.
Isiah Washington, Melter, Fdy. Div.,
Jaques Power Saw Co., Mineral Wells, Texas.

TIMBERLINE CHAPTER

John E. Akers, Iron Fdy. Fmn.,
The C. S. Card Iron Works, Co., Denver, Colo.
William H. Brewer, Fmn., Western Foundry, Denver, Colo.
Carl R. Kasch, Met., U. S. Foundries, Inc., Wheatridge, Colo.
Joseph A. Minardi, Stl. Fdy. Fmn.,
The C. S. Card Iron Works Co., Arvada, Colo.

TOLEDO CHAPTER

Paul E. Gery, Asst. Auto. Power Plant Engr.,
Willys-Overland Motors, Inc., Toledo.
F. J. Vollmayer, Supt. Clean. Rm., Unitcast Corp., Toledo, Ohio.

TRI-STATE CHAPTER

W. R. Erwin, Owner, M. & E. Supply Co., Tulsa, Oklahoma.
Glenn E. Wall, Slsm., Midwest Fdy. Supply Co., Tulsa, Oklahoma.

TWIN CITY CHAPTER

E. George Ball, Abrasive Engr.,
Carborundum Co., Essex Road, Wayzata, Minn.
Vernon Johnson, Molder, King Foundry Inc., Minneapolis.
David A. LaCombe, Main. Engr., King Foundry Inc., Minneapolis.
Richard M. Ovestrud, Fdy. Engr.,
Minn-Moline Power Implement Co., Minneapolis.
Arthur O. Quick, C/R Fmn., King Foundry Inc., Minneapolis.
Marvin J. Smith, Accountant-Off. Mgr., King Foundry Inc., Minneapolis.
Sherman G. Van Derere, Jr., Molder, King Foundry Inc., Minneapolis.

WASHINGTON CHAPTER

Peter F. Wagner, Plannerman,
Puget Sound Naval Shipyard, Bremerton, Wash.

WESTERN MICHIGAN CHAPTER

Austin W. Thompson, Pattn. Engr.,
Lakey Fdy. & Mach. Co., Muskegon, Mich.
Sam A. Vanderlaan, Purch. Agt.,
West Mich. Steel Fdy. Co., Muskegon, Mich.

WESTERN NEW YORK CHAPTER

Robert D. Young, Purch. Agt., Lumen Bearing Co., Buffalo, N. Y.

WISCONSIN CHAPTER

Victor A. Guebard, Jr., Fdy. Stu.,
International Harvester Co., Milwaukee.
Richard L. Nelson, Stu., International Harvester Co., Milwaukee.
Carl L. Petty, Jr., Dist. Sls., Mgr., A. P. Green Fire Brick Co., Chicago.
Donald Spence, Mold. Supv., Pelton Steel Casting Co., Milwaukee.

STUDENT CHAPTERS

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

James W. Barnett
Robert Carruthers
Edward Ross Funk
Lawson P. Harris
Robert E. Hughes
Stanley N. Kuryla
Albert A. Levingston
David Vincent Ragone
Samuel J. Sabbagh
James Veras

MISSOURI SCHOOL OF MINES & METALLURGY

Richard B. Ballmann
Jack P. Brown
Alexander Joseph Craig, Jr.
John T. Cullom
John W. Gilmore
James S. Griffith, Jr.
Clifford E. Turner

OHIO STATE UNIVERSITY

David Floyd Baker
John R. Drayer
Edward H. Losely
Richard Coy McCormick
Croft S. Merritt
Charles J. Weiland

OREGON STATE COLLEGE

William D. Gender

TEXAS A & M

F. L. Maxwell
Jesse Lee Stockard, Jr.
Earl L. Wilson

UNIVERSITY OF ILLINOIS

James C. Green
Robert E. Mollman
Paul E. Neal
Harold A. Rodbar
Charles B. Schuder
Earl R. Trapp
Philip B. Trenkle
Eugene Keith Van Ness
Ronald Veara

OUTSIDE OF CHAPTER

Richmond O. Austin, Tech. Repr., Koppers Company, Inc., Pittsburgh, Pa.

Denmark

Jorgen Jacobson, Fdy. Engr.,
H. Rasmussen & Co., Frederiksgade Odense, Denmark.

Italy

Antonio Scortecci, Direttore,
Instituto Siderurgico, 'FINSIDER', Cornigliano, Italia.

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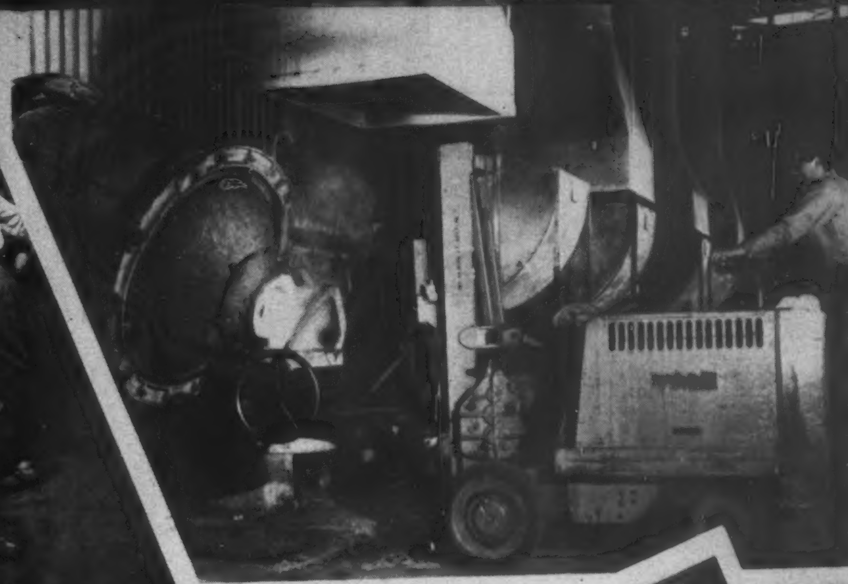
*Company Members
**Sustaining Members

Brake Shoe's BEARING PLANT DOES WORK OF FOUR FOUNDRIES

Newest of American Brake Shoe Co.'s six postwar plants is National Bearing Division's Meadville, Pa., non-ferrous foundry. Embodying the latest developments in foundry layout and equipment, the Meadville plant replaces four of Brake Shoe's discontinued Eastern foundries.

One of Meadville plant's 10 highly-skilled patternmakers, whose patterns, of any shape and complexity, are limited only by facilities for making the actual casting. Patterns are made of only the finest woods and are carefully filed, indexed and stored for re-use.

Lowering a bosh plate core into a mold. Arrangement permits pouring casting while the mold is vertical.



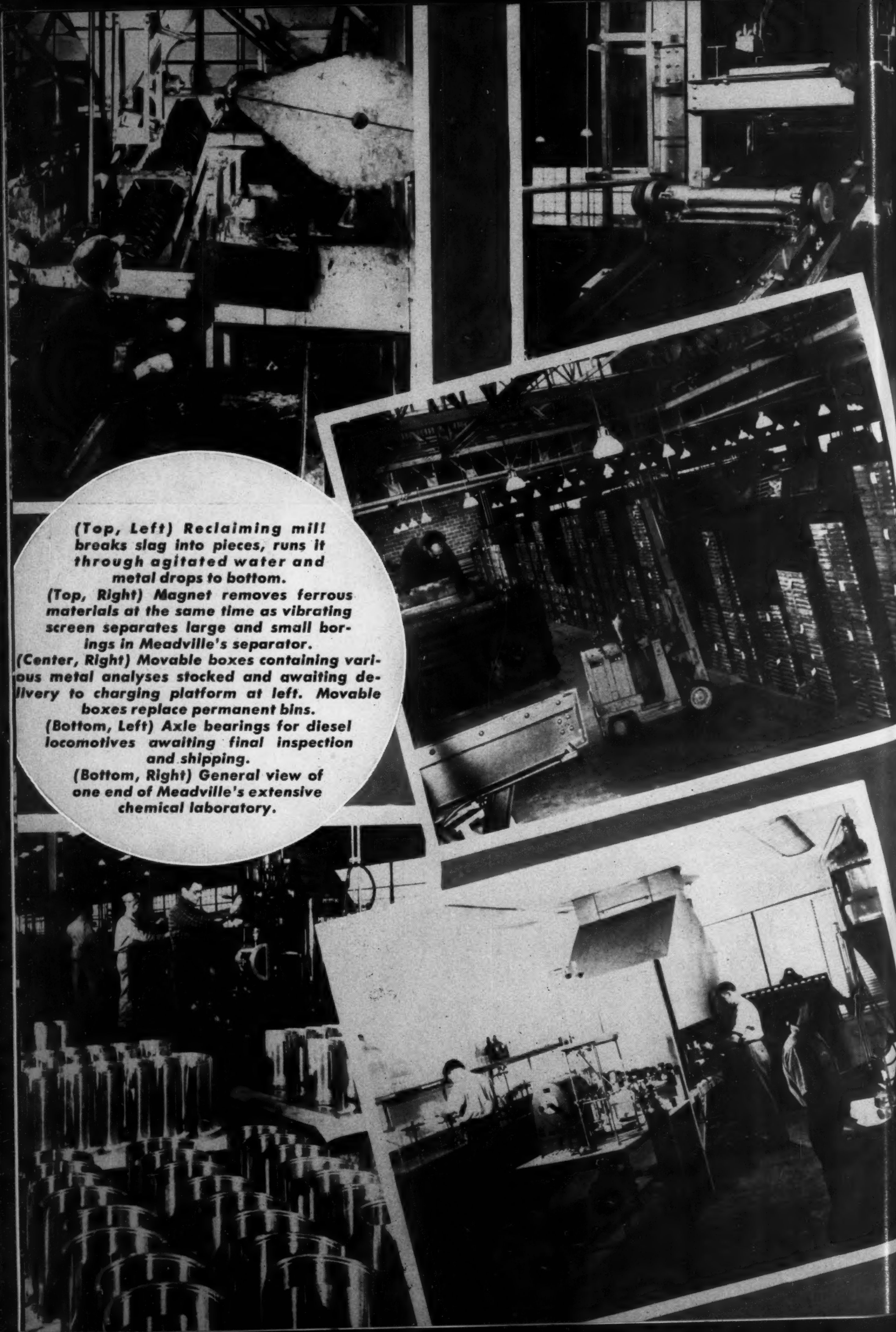
(Top, Left)
Conveyor carries molds into the pouring area and to shakeouts.

(Top, Right) Workmen tapping a heat from one of six direct-fire rotary-type furnaces at Brake Shoe's Meadville plant.

(Center, Right) Charging one of the furnace room's two cupolas. At left charge is being weighed on portable scales.

(Below, Left) Pouring phosphor copper into molds. By the time the last mold is automatically poured, the first will have cooled for removal and shipping.

(Below, Right) Pouring metal into ingot molds automatically from 20,000 lb. reverberatory furnace.



(Top, Left) Reclaiming mill breaks slag into pieces, runs it through agitated water and metal drops to bottom.
(Top, Right) Magnet removes ferrous materials at the same time as vibrating screen separates large and small borings in Meadville's separator.
(Center, Right) Movable boxes containing various metal analyses stocked and awaiting delivery to charging platform at left. Movable boxes replace permanent bins.
(Bottom, Left) Axle bearings for diesel locomotives awaiting final inspection and shipping.
(Bottom, Right) General view of one end of Meadville's extensive chemical laboratory.

Chapter Meetings

DECEMBER 16

NORTHEASTERN OHIO
Carter Hotel, Cleveland
CHRISTMAS PARTY

DECEMBER 17

TWIN CITY
Radisson Hotel, Minneapolis
CHRISTMAS PARTY

NORTHWESTERN PENNSYLVANIA
Moose Club, Erie
CHRISTMAS PARTY

OREGON
Heathman Hotel, Portland
CHRISTMAS PARTY

CHESAPEAKE
Engineers' Club, Baltimore
E. T. KINDT
Kindt-Collins Co.
"Pattern Engineering"

WESTERN MICHIGAN
Spring Lake Country Club
CHRISTMAS PARTY

DECEMBER 18

N. ILLINOIS—S. WISCONSIN
Faust Hotel, Rockford, Ill.
CHRISTMAS PARTY

JANUARY 3

CENTRAL ILLINOIS
Jefferson Hotel, Peoria
CLYDE A. SANDERS
American Colloid Co.
"Modern Foundry Sand Practice"

METROPOLITAN
Essex House, Newark, N. J.
ROUND TABLE DISCUSSIONS

JANUARY 5

TOLEDO
Toledo Yacht Club, Toledo
G. VENNERHOLM
Ford Motor Co.
"Casting Methods in Automotive Manufacturing"

JANUARY 6

SAGINAW VALLEY
Fisher's Hotel, Frankenmuth, Mich.
CLYDE A. SANDERS
American Colloid Co.
"Modern Molding Sand Practice"

TWIN CITY
Covered Wagon, Minneapolis
CHARLES B. SCHUREMAN
National Lead Co.
"Foundry Sands"

MICHIANA
LaSalle Hotel, South Bend, Ind.
WILLIAM MCFERRIN
Electro Metallurgical Co.
"Metallurgical Problems and Elimination of Scrap in Gray Iron Castings"

JANUARY 8

CHESAPEAKE
Alcazar, Baltimore
GRAND ANNUAL OYSTER ROAST

JANUARY 10

CENTRAL INDIANA
Athenaeum, Indianapolis
WILLIAM ZIEGELMUELLER
Electric Steel Castings Co.
QUESTION AND ANSWER PANEL MEETING

CENTRAL OHIO
Chittenden Hotel, Columbus
E. C. HOENICKE
Eaton Manufacturing Co.
"Permanent Mold Castings"

JANUARY 11

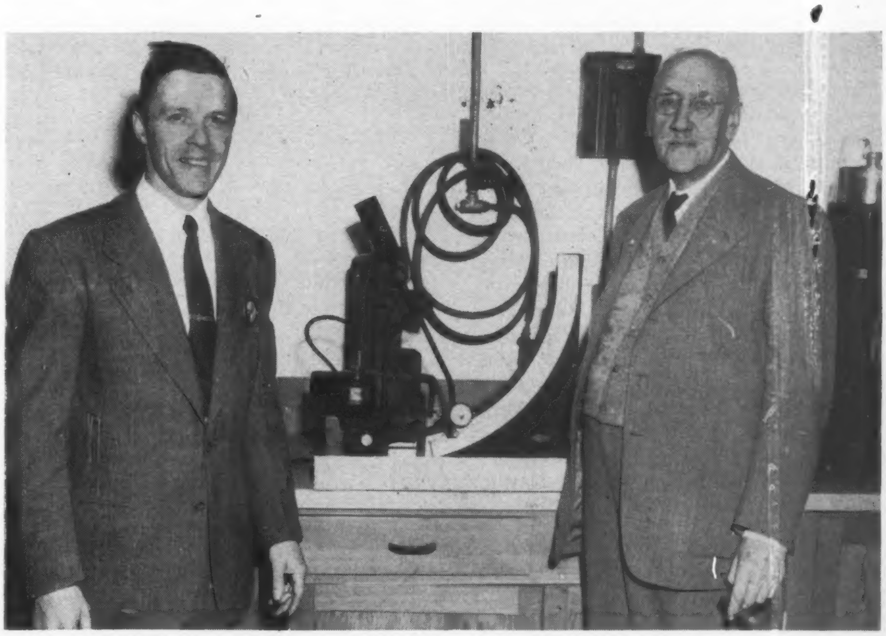
ROCHESTER
Seneca Hotel, Rochester
B. P. MULCAHY
Foundry Consultant
"Foundry Coke and Cupola Operations"

JANUARY 14

MISSOURI SCHOOL OF MINES
Experimental Station, Rolla, Mo.
R. B. PARKER
American Brake Shoe Co.
"Planning Tomorrow's Management"

PHILADELPHIA
Engineers' Club, Philadelphia
CLYDE A. SANDERS
American Colloid Co.
"Selection of Foundry Clays"

E. CANADA & NEWFOUNDLAND
Mount Royal Hotel, Montreal
LESTER B. KNIGHT
Lester B. Knight & Associates, Inc.
"Foundry Mechanization"



Quarterman Molder Harold R. Wolfer (left) of the Puget Sound Naval Shipyard and Dr. H. Ries, chairman of the A.F.S. Sand Division, photographed in the Shipyard's sand laboratory during Dr. Ries' recent visit on an advisory tour of West Coast Shipyards. Dr. Ries noted pleasant working conditions and cited the foundry as "the cleanest I have ever visited."

FOUNDRY *Personalities*

Earl Eastburn, formerly foundry superintendent of the Phosphor Bronze Smelting Co., Philadelphia, recently resigned after 42 years' service with that company to join the Philadelphia Bronze & Brass Corp. as sales engineer.

A.F.S. National Director **W. J. MacNeill,** general manager of the Dayton Malleable

W. J. MacNeill

Iron Co.'s G.H.R. Foundry Division for the last three years, has been appointed assistant to the president of the parent company. Mr. MacNeill is succeeded as head of G.H.R. by **E. J. Stockum,** a vice-president of Dayton.

A major expansion in the industrial products section of the General Electric X-Ray Corp. has resulted in several promotions. They are: **Joseph W. Rantfl,** and **Dennis Vath** to be merchandising assistants in the X-Ray Diffraction department; **Arthur Pace,** to be product engineer in charge of Radiography and Fluoroscopy; and **Reuben Hackbart,** to be laboratory assistant in the Radio and Fluoroscopy department. It was further announced that five men have been appointed industrial sales representatives: **Paul McGrath,** for Connecticut and Eastern New York; **Jack LaClair,** for Northern New Jersey; **C. F. Leeti,** for Eastern Pennsylvania; **Richard M. Landis,** for Northern Ohio; and **Leo Sheldon,** for Northern Illinois.

George R. Milne has been appointed operating manager of the National Carbide Corp. and will continue to make his headquarters at the company plant in Louisville, Ky., where he was formerly works manager. Simultaneously with Mr. Milne's appointment, it was announced that **Russell T. Lund** has been made assistant operating manager. Both men began with Air Reduction Sales Corp., a National Carbide subsidiary.

Lyman Thunfors recently succeeded **William G. Grant** as vice-president and general manager of the Paul M. Wiener Foundry Co., Muskegon, Mich. Mr. Grant, who has been ill for the last year, will continue to serve the company in an advisory capacity. Mr. Thunfors, a native of Muskegon, returns there from a four-year affiliation as vice president in charge of manufacture at the Richmond Radiator Co., Uniontown, Pa. Prior to that he was with Caterpillar Tractor Co. in various supervisory capacities for several years.

Walter A. Zeis has been appointed exclusive sales representative for its product, Linoil, in Werner G. Smith Co.'s Missouri and Southern Illinois territory. Since 1937, Mr. Zeis has operated his own foundry supply company, and prior to that, was with the pattern department of American Steel Foundries for 27 years. An active member of the A.F.S. St. Louis District Chapter for many years, Mr. Zeis has been a director since 1943, and is serving his fourth consecutive term as Chapter Membership Committee Chairman.

Harold K. Hochschild, president of the American Metal Co., recently accepted the chairmanship of the Non-Ferrous Metals Division of the current United Hospital Fund Campaign. The fund is seeking some $3 million to meet the needs of 86 voluntary hospitals in New York City. **Charles Macall,** general sales manager of the Bethlehem Steel Corp., has accepted chairmanship of the Steel and Iron Division of the Campaign.

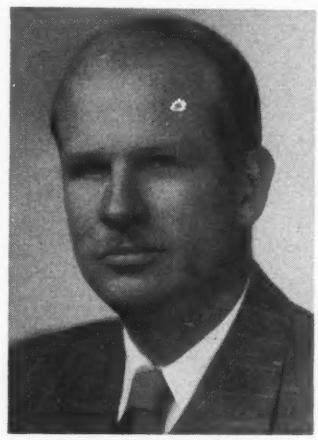
Richard L. Jones, Assistant Works Manager of American Steel Foundries, East St. Louis, Illinois, was elected a Director of the St. Louis District Chapter at a meeting of the Chapter Board of Directors, October 19, to replace **Charles F. Rohlkoetter,** American Steel Foundries, who resigned recently on being transferred to the Chicago plant. Mr. Jones will serve as a Director until 1950, filling the vacancy left by Mr. Rohlkoetter.

Harold Boutell of Cherry Valley, Ill., has been appointed assistant superintendent of the malleable foundry of Gunite Foundries Corp., Rockford, Ill. Mr. Boutell has been with Gunite since 1943 as head of its Foundry Time Study Dept.

Marcus E. Borinstein, for four years manager of Ferrous and Non-Ferrous Scrap Merchandising for the James Flett Organization, Inc., Chicago, has been named a vice-president of the company.

W. Muller and **W. B. K. Boom, Jr.,** 1948 mechanical engineering graduates of Delft University, are contemplating a four months visit to United States foundries and other industrial plants. Employed by G. Dikkers & Co., N. V., Hengelo, Netherlands, they have been studying precision casting methods and investigating thermosetting casting resins for possible use in corrosion resistant valves. Dikkers has a 5100 man plant at Hengelo, and a plant in Brussels employing 200. At the Hengelo plant steel is cast three days a week and iron three days, using the same basic type of molding sand and the same crew and equipment. Acid Bessemer steel is made. Other operations include copperbase and light alloy casting, permanent mold casting of aluminum alloys, and precision casting of aluminum and manganese bronzes, aluminum, and some high alloy steels.

Charles R. Marshall and **Lloyd Veitch** have been appointed managing directors of the Industrial Foundry Supply Co., of San Francisco and Oakland, Calif., an affiliate of the Independent Foundry Supply Co. of Los Angeles. Mr. Marshall is secretary of the Northern California Chapter of the American Foundrymen's Society and is immediate past president of the Oakland Junior Chamber of Commerce and an associate director of the Bay Area



C. R. Marshall

Industrial Exposition. Mr. Veitch, a lifelong resident of Oakland, has been active in the foundry and industrial sand business there for several years.

Dr. Austen J. Smith, for 11 years assistant director of metallurgy research for the Lunkenheimer Co., Cincinnati, was recently appointed assistant professor of Chemical, Metallurgical and Mechanical Engineering at Michigan State College. A graduate of Yale University's Sheffield School, he obtained his Ph.D there in 1937. Currently serving as a member of the A.F.S. Brass and Bronze Division Research Committee, Dr. Smith was chairman of Cincinnati District Chapter's Edu-

cational Committee last year and vice chairman this year. He has served as chairman of ASM's Cincinnati Chapter and is a member of AIME and the British Institute of Metals.

Since the first of the fall semester, **Roy W. Schroeder** has been assistant professor of foundry and pattern laboratory in the mechanical engineering department of the University of Illinois, Navy Pier branch, Chicago, where he has been teaching during the past year. Prof. Schroeder worked in foundries in Galena, Rockford, and Chicago, Ill., and has taught foundry practice at the University of Illinois (Urbana), Lewis Institute, Crane Technical High School and Washburne Trade School, Chicago. Chairman of the A. F. S. Apprentice Contest Committee, his most recent publication is *"An Analysis of 1948 A. F. S. Apprentice Contest Entries"* which appeared in the October 1948 issue of AMERICAN FOUNDRYMAN, page 24-27.

C. W. Chandler of San Francisco has accepted a position with the Rincon Iron & Brass Foundry of San Francisco. Mr. Chandler recently deactivated the Cook & Chandler Brass and Bronze Foundry, of which he was general manager.

Leslie Schuman, National Malleable & Steel Castings Co., and **Wilbur Thomas,** Bowler Foundry Co., were recently appointed directors of the A.F.S. Northeastern Ohio Chapter. Mr. Schuman fills the unexpired term of **Henry C. LeBeau,** Ohio Injector Co., who, due to other commitments was forced to resign his directorship. Mr. Thomas will complete the unexpired term of **William Gude,** Penton Publishing Co., who was recently elected Chapter Vice-Chairman.

G. B. Davis, assistant sales manager of the Baker-Raulang Co., Cleveland, has been promoted to sales manager. This does not involve any change of duties as Mr. Davis has been in active charge of sales for some months. A graduate of Hillsdale College, he has been with Baker-Raulang since 1935.

Herman C. Phelps, formerly West Coast sales manager for All-State Welding Alloys Co., Inc., White Plains, N. Y., has been appointed sales manager for the company.

Hubert Chappie, veteran of 29 years in the foundry industry has been appointed superintendent of the Torrance, Calif., foundry of the National Supply Co. Mr. Chappie has been affiliated with the Lebanon Steel Foundry, Texas Electric Steel Casting Co., and the Columbia Steel Co., where he was foundry superintendent.

Bruce W. Schafer, manager of the Detroit Electric Rocking Furnace Division of the Kuhlman Electric Co., Bay City, Mich., announces the appointment of the **Fred M. Randall Co.,** Detroit, as its advertising and merchandising counsel.

George W. Anselman has been named foundry superintendent of Woodruff & Edwards Inc., Elgin, Ill. Formerly service engineer, Goebig Mineral Supply Co., Chicago, he was service engineer and super-

(Continued on Page 83)

A. F. S. CHAPTER DIRECTORY

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WISCONSIN CHAPTER
Secretary, W. W. Edens, Badger Brass & Aluminum Fdry. Co.

STUDENT CHAPTERS

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OHIO STATE UNIVERSITY *Secretary-Treasurer,* Eldon Bonet
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
Secretary-Treasurer, Martin J. O'Brien
OREGON STATE COLLEGE *Secretary,* John P. Meece
UNIVERSITY OF ILLINOIS *Secretary,* Robert W. Bales
TEXAS A & M COLLEGE *Secretary,* Victor C. Henkel.

CHAPTER ACTIVITIES NEWS

Rochester

G. M. Etherington
Gleason Works
Chapter Reporter

THE NOVEMBER 9 MEETING of the Chapter was held in the Palm Room of the Hotel Seneca. William H. Johnson, metallurgist, Naval Research Laboratory, Washington, D. C., was the guest technical speaker. His topic for the evening was *"Gating Systems for Metal Castings."*

The speaker claimed that the behavior of gating systems is not really understood and that many systems do not function as supposed. To clarify this statement Mr. Johnson presented a film entitled, *"Gating Systems for Metal Castings"*. This color film showed steel entering the sprue and mold through different types of gating systems. The pictures showed not only the feeding characteristics of the various gating systems but also the resulting turbulence in the mold. High speed photographs at 1000 frames per second showed the flow of molten steel through sprues. No gating system shown was effective in preventing turbulence of the metal in the mold.

"Cutting Costs in the Coreroom" was the subject of an address by L. G. Robinson of the Werner G. Smith Company, speaking at the October meeting, held in the Palm Room of the Hotel Seneca.

The speaker stressed sand, measuring, mixing and baking as fundamentals in cutting core costs. Although a core may be made with any sand, a sand for a good core should preferably be free from clay and organic matter. Cereal binders instead of clay are used in oil sand mixtures in the range of $\frac{1}{2}\%$ to 1% to provide green strength. The use of dry sand is desirable in core sand mixing since it eliminates variable initial moisture.

The use of the least skilled and the least intelligent help to prepare core mixtures may be the most expensive way of having it done. Mr. Robinson pointed out the need for adhering to set sand, oil, cereal ratios and stressed the reasons for not allowed battered and crushed measuring containers.

A proper mixing sequence and cycle exist for every combination of sand and binders. This procedure should be determined by the foundry and unfailingly adhered to for maximum uniformity and economy.

Of the factors mentioned, baking can cause more trouble than any of the others. Reasonably close adherence to the definite time and temperature required to bake a core properly is essential. The speaker claimed it is economical to install oven equipment which will give uniform heat distribution and thus have all cores properly baked, rather than to use poor equipment to overbake some cores while others are underbaked.

Following Mr. Robinson's interesting presentation of an important subject, was a lively discussion period. This, in turn, was followed by slides and movies taken at the Annual Picnic held on September 11.

Detroit

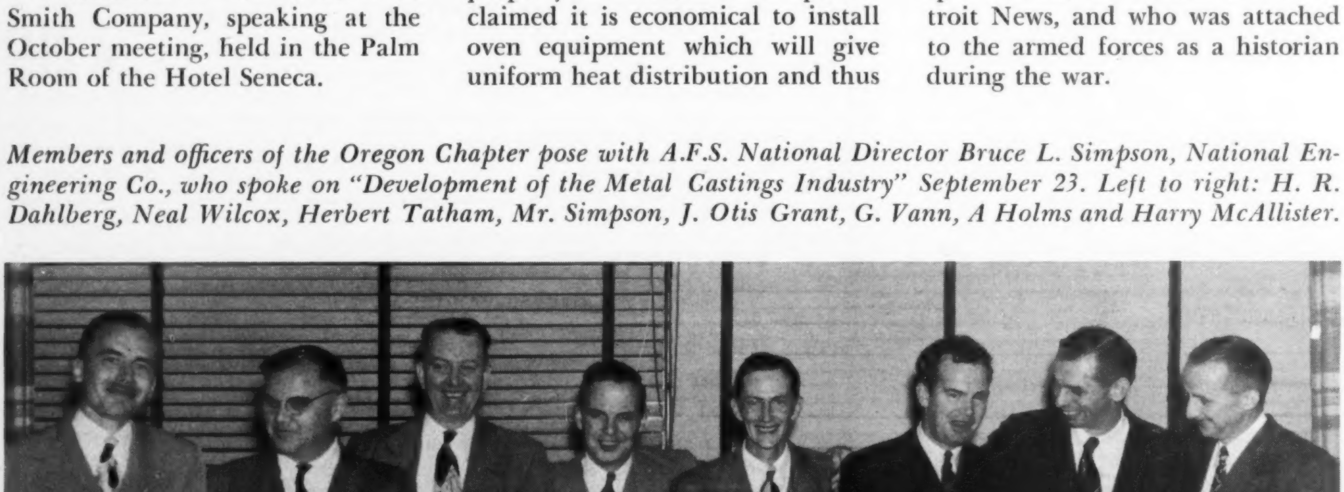
A. H. Allen
Penton Publishing Co.
Chapter Reporter

AN UNUSUAL METHOD of coremaking for the lost-wax process was outlined in detail by Morris Bean, president of Morris Bean & Co., Detroit, at the November 18 meeting of the Chapter, held at the Rackham Memorial.

Mr. Bean has been active in this field of coremaking since 1930 and was in charge of the Antioch Foundry, where the process was developed, from 1940 to 1946. The processes he described are applicable to castings weighing from a few ounces to more than 2000 lbs.

The technical discussion followed a dinner and coffee talk on, *"Are We Moving Toward War?"*, presented by Colonel S. L. A. Marshall, special editorial writer for the Detroit News, and who was attached to the armed forces as a historian during the war.

Members and officers of the Oregon Chapter pose with A.F.S. National Director Bruce L. Simpson, National Engineering Co., who spoke on "Development of the Metal Castings Industry" September 23. Left to right: H. R. Dahlberg, Neal Wilcox, Herbert Tatham, Mr. Simpson, J. Otis Grant, G. Vann, A Holms and Harry McAllister.



Officers of the Eastern New York Chapter, pictured at the November 16 meeting, are, seated left to right: Director Jasper Wheeler, Wheeler & Bros.; Director Kenneth Eckard, Eddy Valve Co.; Vice-Chairman Alexander Andrew, American Locomotive Co.; Sec'y-Treasurer Ugo Navarette, General Electric Co.; Director Leo Scully, Scully Foundry & Machine Co. Standing, left to right, Director Paul Wilson, Hunter Foundry; Director Scott McKay, Rensselaer Polytechnic Institute; Director Charles Kilmer, Swan-Finch Oil Co.; Director Theodore Carlson, General Electric Co.; and Director Reginald De Varennes of the Rensselaer Valve Co., Troy, N.Y.

Twin City

O. J. Myers
Werner G. Smith Co.
Chapter Reporter

THE ANNUAL JOINT MEETING of the Twin City Chapter of the American Foundrymen's Society and the American Society for Metals was held in the dining hall of the American Hoist & Derrick Co., St. Paul, November 4.

More than 150 members and guests heard Charles Locke, supervisor of Foundry Process Research for the Armour Research Foundation in Chicago, speak on the fundamental research being carried out in the field of gating and risering of castings.

The Armour Institute is attempting to control the feeding of liquid metal from casting risers to the main body of the castings by first developing an empirical and mathematical concept of what is needed and then applying this concept to practice.

The .3 per cent volume change that steel undergoes during its solidification range must be counteracted by proper riser feeding.

Experiments by Briggs and Gezelius in "bleeding" spherical castings have been corroborated mathematically by Mr. Locke and his associates. Analogous results have been made by Victor Paschkis at Columbia University and according to the speaker, the foundrymen must prepare for an influx of mathematical, hydraulic, electrical, and physical terminology into the foundry field.

Riser efficiency is a function of two major factors: (1) Volume relationship between the riser and the casting and, (2) Heat quantities. Mr. Locke showed that the heat loss was proportionate to the surface area of the riser and the heat available was a direct function of the riser volume.

Using these mathematical concepts, the speaker evolved a formula which indicated that the surface area of the riser divided by the riser volume is of the utmost importance in economic riser design.

Metropolitan Chapter

George Baer
Atlas Foundry Co.
Publicity Chairman

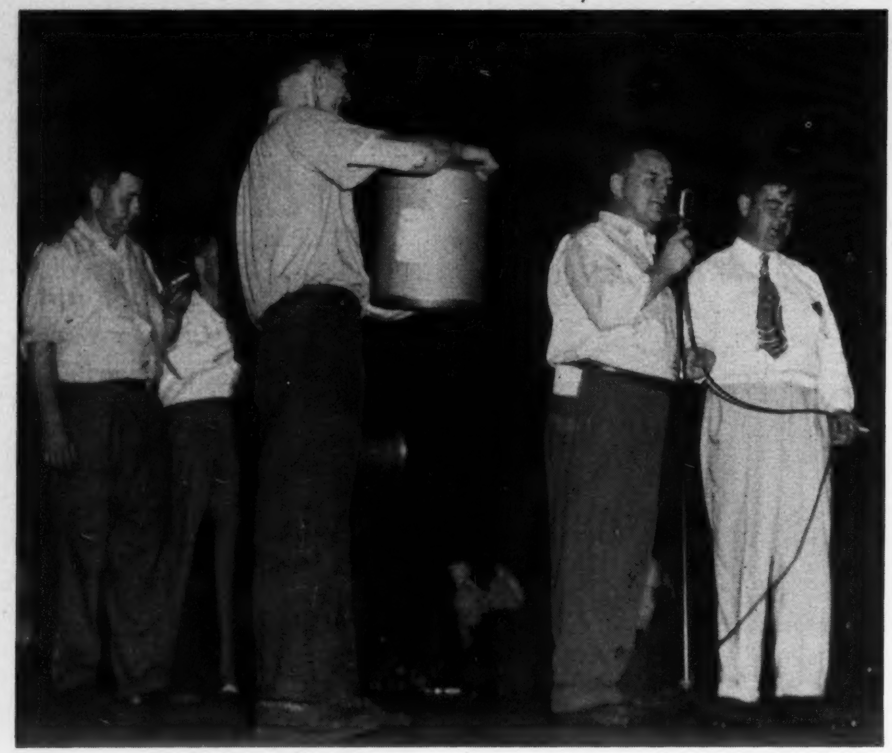
AN ENTHUSIASTIC AUDIENCE OF Metropolitan Chapter members and guests heard Charles K. Donoho, chief metallurgist of American Cast Iron Pipe Co., Birmingham, Ala. discuss *"Acid Electric Steel for Castings"* at the Essex House, Newark, N. J. on November 1.

Mr. Donoho's talk, illustrated with slides, was concerned primarily with the influence of melting practice as related to quality of steel. The results of many tests indicate that the following practice is preferred in melting quality carbon steel:

1. Sufficient carbon in charge to allow a good oxidizing boil.
2. Recarburization after boil to eliminate as much oxide as possible as a gas.
3. Additions of alloys and deoxidizers as close to tapping time as possible. Usually about two min.

Interest in Mr. Donoho's talk was

A.F.S. National Director J. E. Kolb, Caterpillar Tractor Co. (left); W. M. Ball, R. Lavin & Sons, the evening's speaker (center) and George Hazen, Brass Foundry Co, talk things over at Central Illinois Chapter's meeting.



Awarding of prizes at Western Michigan Chapter's Tenth Annual Golf Tournament. Left to right: C. H. Cousineau, Lakey Foundry & Machine Co.; C. J. Lonnee, Clover Foundry Co.; Rudolph Flora, Clover Foundry Co.; Chapter Chairman W. A. Hallberg, Lakey Foundry & Machine Co.; and Master of Ceremonies for the evening's festivities, K. L. Sanders.

evidenced by many questions during the discussion period following, held under the direction of Herbert E. Cragin, Jr., plant superintendent of Taylor-Wharton Iron & Steel Co., High Bridge, N. J. who acted as technical chairman of the meeting. Topics discussed were: pin hole porosity in silicon killed steels. Relation of pouring temperature to physical properties. Induction furnace melting vs. electric arc furnaces. Use of oxygen to reduce carbon. Aluminum and ductility.

Oregon State College
William W. Waite
Publicity Chairman

THE OREGON STATE COLLEGE student chapter met November 10 in the Memorial Union Building on the Oregon State College campus.

William Albohn, engineer for the Western Industrial Supply Company, was the speaker for the evening. E. Prehn, of Prehn and Son and the Western Industrial Supply Company, and W. B. Kirby, engineer, Electric Steel Co., were present for the meeting.

Mr. Kirby, the chapter's industrial advisor, extended greetings of the chapter to the 10 new members. Mr. Albohn stressed the necessity for college students to get practical foundry experience along with their college educations. He also stated that "the less the college boy talks about what he learned in college, the better he will get along in the foundry."

Charles Lauderdale, student member who worked in Detroit during the summer vacation told the group of the great assistance and hospitality offered to him by A.F.S. Headquarters and the Detroit Chapter. A Carborundum Company film showing the history, manufacture, and numerous applications of abrasives was presented.

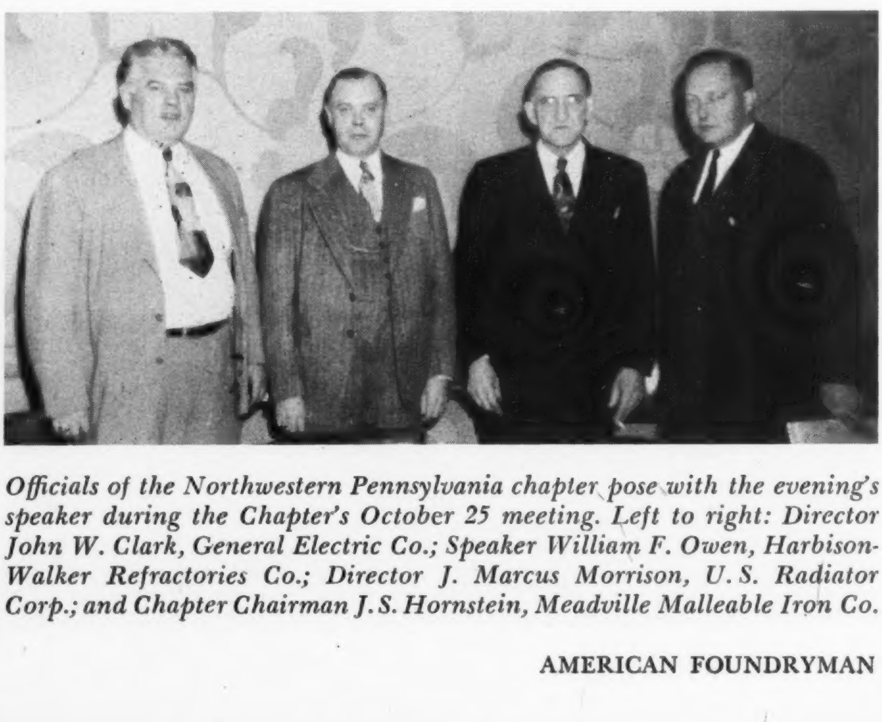
The roster of officers of the Oregon State Student Chapter for the 1948-49 season is as follows: President, John F. Oettinger; vice-president. David E. Crabtree; secretary, John P. Meece; and treasurer, Everett M. Uebel.

Central Illinois Chapter
V. W. Swango
Caterpillar Tractor Co.
Secretary-Treasurer

APPROXIMATELY 75 PEOPLE attended the November meeting of the Central Illinois Chapter. We were honored by the presence of A.F.S. Past President Max Kuniansky, who gave a short talk on the importance of attracting young men to the foundry industry by top line management being more interested in making the new employee feel at home.

J. E. Kolb, National Director of A.F.S., gave a very interesting coffee talk on some of the problems of A.F.S. Headquarters and how they are being solved.

"Non-ferrous Foundry Practice" was presented by W. M. Ball, Jr., Metallurgist and Foundry Consultant, R. Lavin & Sons, Chicago. He stressed the importance of using facilities at hand plus common sense



Officials of the Northwestern Pennsylvania chapter pose with the evening's speaker during the Chapter's October 25 meeting. Left to right: Director John W. Clark, General Electric Co.; Speaker William F. Owen, Harbison-Walker Refractories Co.; Director J. Marcus Morrison, U. S. Radiator Corp.; and Chapter Chairman J. S. Hornstein, Meadville Malleable Iron Co.

to overcome problems that arise in the foundry.

George B. Hazen, President of the Brass Foundry Co. was technical chairman for the evening.

The December meeting will be the Third Annual Christmas Party and Ladies Night and will be held December 11 at the American Legion Hall, Peoria, Ill.

Charles Locke (third from left), Armour Research Foundation, Chicago, speaker of the evening, is flanked by officers and directors of the Twin City Chapter at the Chapter's annual joint meeting with ASM, held November 4.

Western New York

Roger E. Walsh
Hickman, Williams & Co.
Chapter Secretary

FIVE PAST CHAIRMEN of the Chapter were present at the November 5 meeting, held at the Hotel Sheraton, Buffalo. They were Theodore H. Burke, John C. McCallum, Frank E. Bates, Rinehold D. Loesch and Arthur H. Suckow.

G. R. Gardner, assistant chief of the Cleveland Division of the Aluminum Research Laboratories of the Aluminum Company of America, spoke on *"The Use of Molding Sands in All Types of Foundries"*, in which he said that every foundry has its own ideas about sand.

The time is far away, he said, when enough information on molding sand can be given for any specified service. Standard tests are good, he added, but not to be confused with sand specifications, and there are not yet specifications for molding sand which would class it as an important engineering material, he added, because sand by its very nature fluctuates constantly. It pays, Mr. Gardner said, to use the best clay because it is the foundation of foundry work.

According to Mr. Gardner, the foundryman of 1538, molding with loam, knew which qualities to look for, the advantages of synthetic sand, iron oxides, carbon coating and silicate binders and the fundamentals of green sand practice. There isn't much we know about sand today, that the foundryman of 1538 didn't know, according to Mr. Gardner, and while a few materials in use at that time have been abandoned, not many have been found to take their place.

Illustrating his talk with slides, Mr. Gardner showed how buckles, scabs, and veins result from certain stresses when sand cannot rearrange itself on the surface of the mold, due to expansion and contraction.

J. M. Snyder (left) of National Grinding Wheels and Edward Brumley of Brumley-Donaldson Co. wearing happy grins as they watch the successful results of their work in planning Northern California Chapter's outing.

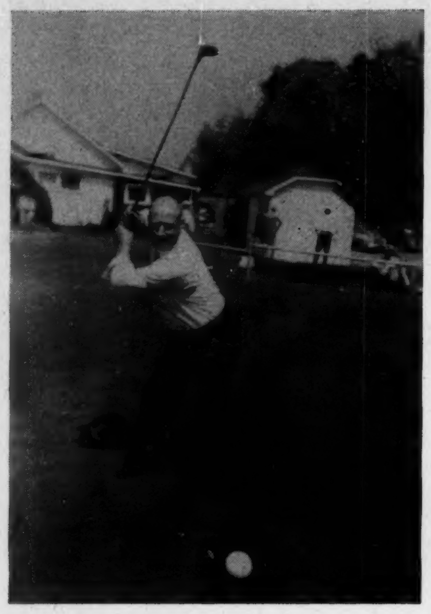
Birmingham District

J. P. McClendon
American Cast Iron Pipe Co.
Chapter Reporter

EDUCATION AND ECONOMICS were the featured topics as the Chapter opened its 1948-49 technical sessions with a meeting at the Tutwiler hotel, Birmingham.

Approximately 90 foundrymen and friends heard a "double feature" program featuring addresses by Forbes McKay of *Progressive Farmer* magazine and George K. Dreher of the Foundry Educational Foundation.

Mr. McKay's talk was titled, "What I Like About the South", and utilized charts to point out (1) the large growth in new business in the South as compared to much smaller percentages of increase in other sections (2) the leveling off in cotton acreage and



John Westerman, Campbell, Wyatt & Cannon Foundry, wasn't "on the ball" as he wound up for a mighty swing at a tee marker at Western Michigan Chapter's Tenth Annual Golf Tournament, August 21.

the large percentage of increase in yield per acre (3) mechanization and electrification of farms in the last eight years has jumped several hundred per cent (4) ownership operation of farms is rapidly replacing the sharecropper and renter (5) farm mortgages have dropped to less than 26 per cent of their former value, and (6) wealth of Southern farmers is shown by the huge amounts they now have invested in U.S. Savings Bonds and in banks.

This graphic presentation of the growth and wealth of the Southern farmer, Mr. McKay said, can only spell one thing—continued demand for all products.

Mr. Dreher was introduced by Samuel Carter, American Cast Iron Pipe Co., and outlined the accomplishments of the Foundry Educational Foundation and the objectives of this industry-sponsored program, to:

(1) Aid six geographically-distributed colleges in developing courses of study to prepare young men for the foundry industry.

(2) Assist the colleges in procuring required foundry equipment.

(3) Establish scholarships.

(4) Encourage prospective foundrymen to take the courses.

The A.F.S. FOUNDRY TRAINING COURSE FOR COLLEGE GRADUATES was used as a basis for the FEF program.

The speaker outlined the statistical needs for managerial talent and stated that about 100 graduates would be needed in 1948, and that this need would increase at the rate of 100 per year, up to an annual total of 800 to 1,000 graduates.

Eastern New York

John M. Jones
American Locomotive Co.
Acting Publicity Chairman

"GATING, RISERING and Gas Porosity" was the subject of a talk by Fred G. Sefing of the International Nickel Co., before the November 16 meeting, held at the Circle Inn, Lathams Corners.

It was announced that the Chapter's First Annual Christmas Party will be held December 14 at the Circle Inn at Lathams Corners.

Chapter Chairman W. A. Hallberg, Lakey Foundry & Machine Co., presenting one of the prizes at Western Michigan's Golf Tournament.

Wisconsin

Frank M. Jacobs
Standard Brass Works
Chapter Reporter

"WHY, WHEN AND HOW of Foundry Mechanization", a talk by R. W. Jennings of the John Deere Tractor Works, Waterloo, Ia., kept 241 Wisconsin foundrymen at attention at the Chapter's November 12 meeting, held at the Schroeder hotel, Milwaukee.

Mr. Jennings emphasized the need of mechanization for (1) the reduction of hard physical labor (2) making the foundry a better place to work (3) extending the age limit of employees (4) reduction of costs and the extension of markets.

Mr. Jennings stated that in American industry each worker controls the output of 45 men by the use of electricity. He asked "How do our foundries compare with industry as a whole?" and "How many helpers do our foundry workers control?" When a man can have 45 helpers, it is only consistent that his wage scale will be held high, Mr.

(Continued on Page 86)

Two of the principal speakers at the November 4 meeting of the Saginaw Valley Chapter, held at Fisher's Hotel, Frankenmuth, Mich., were (left) Charles Schneider, Brisk Foundry & Machine Co., Imlay City, Mich., and Twin City Chairman Carleton C. Hitchcock, R. Hitchcock & Sons.

Kodak

Saves darkroom steps... this "all-in-one" X-RAY FIXER

Single-powder formula simplifies mixing, is quickly soluble—faster, more efficient to use

A real darkroom convenience, this "all-in-one" Kodak X-ray Fixer. In a single powder, it has everything you need to fix and harden x-ray films. It saves you time—and mixing steps—because it's simple to prepare—only one container to open. It often saves trouble, too, because of its low stain potential. Its exact factory-mixing and uniform high quality give you clear, long-lasting radiographs.

Available in five-gallon and one-gallon sizes in hermetically sealed cans to assure freshness and easy pouring. Also packaged in 25- and 100-gallon sizes. Order from your x-ray dealer.

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3 other processing chemicals especially developed by Kodak for x-ray films

Kodak Liquid X-ray Fixer and Replenisher. Use it where faster preparation, greater clearing speed, longer life are necessary. Full efficiency extended by replenishment.

Kodak Rapid X-ray Developer. Designed especially for Kodak X-ray Films, this developer brings out maximum radiographic sensitivity—yet costs no more than other developers.

Kodak Liquid X-ray Developer and Replenisher. Offers greater preparation convenience. There is economy, too, in the unit package.

NEW Foundry Products

Readers interested in obtaining additional information on items described in New Foundry Products should send requests to Reader Service, American Foundryman, 222 W. Adams St., Chicago 6, Ill. Refer to the items by means of the convenient code numbers.

Microfilm Camera

DC1—A triple-purpose microfilm camera, capable of photographing copy up to 42 in. wide by any length in one continuous exposure has been developed by Diebold, Inc. Designed primarily for microreproduction, the camera can be used for reproducing large production control and accounting records and also serves as a

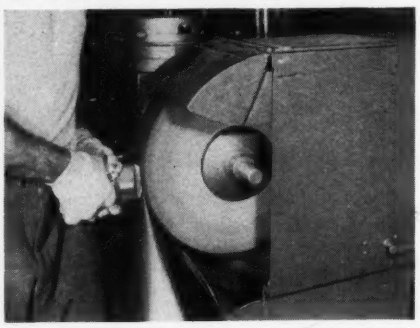
film printer and enlarger. The Flofilm 42 in. camera resembles a home laundry mangle and has a reduction ratio of 34 times, which reduces the microfilm image to less than 1/1000 of the area of the original copy. The camera is capable of filming the longest copy in existence in one operation. A 100 ft. roll of film can take copy up to ⅝ of a mile in length. With the enlarger, images can be "blown back" at reduced size, original size or larger on a single sheet or roll of paper in one operation. Copy can be moved through camera at speeds of either 30 or 60 fpm. Lighting intensity is controlled by pushbutton.

Metal Cleaning Machine

DC2—The "Jet Blast" machine for wet abrasive blast cleaning and finishing of metal surfaces is announced by the Armstrong Chemical and Machine Co. The machine removes rust, scale and undesirable metal particles by projecting a slurry of fine abrasive suspended in water against the surface to be cleaned. Permissible variation in abrasive size (60 to 1250 mesh) makes it commercially possible to produce finishes as low as 2-3 micro in. rms. The method produces a matte finish with practically no removal of metal. Standard model specifications are: 30 x 30 in. cabinet, 77 in. high, one blast nozzle and exhaust blower direct connected to ¼ hp motor; and 48 x 42 in. cabinet, 108 in. high, one to eight blast nozzles and exhaust blower direct connected to 1 hp motor. Watertight welded steel construction. Siphon jet principle used in transferring grit slurry—thus no moving parts contact abrasive liquid. Each unit is self-contained and fits shop compressed air lines.

Contact Wheel

DC3—A contact wheel designed for heavy grinding with abrasive belts at speeds of 10,000 sfpm or more is announced by the Minnesota Mining & Mfg. Co. Major advantages of the "K" Contact Wheel are faster and cooler stock removal, lower production costs and chatter-free grinding. Wheel can be used at the maximum speeds of modern equipment. Wheel is made in 8 and 16 in. diameters, in face



widths of 2, 3, 4 and 6 in. and is designed for use with cloth belts coated with silicon carbide or aluminum oxide mineral grains. High speeds increase amount of work surface contacting metal, lessening operator fatigue because of need for less work pressure against belt. Loading and glazing of belt are minimized due to lessened grinding heat fusing fewer metal particles to mineral grains on belt, and because centrifugal force throws out more cuttings at high speeds.

Fire Extinguishers

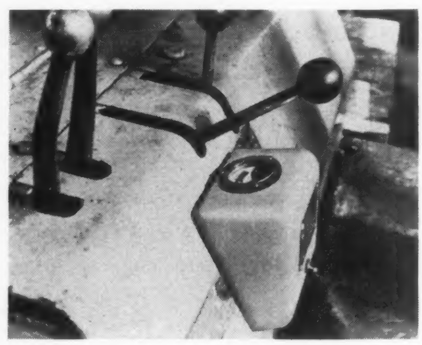
DC4—A complete new line of 2½-gallon resistance welded silicon bronze fire extinguishers to replace riveted and copper fabricated units of the same capacity is announced by American-LaFrance Foamite Corp. Types available in the new line are soda-acid, foam, plain water, and antifreeze water. These extinguishers are each 4½ lbs. lighter than others of the same type and are stronger, more smartly styled. Transparent plastic nozzle provides clear vision of passageway and greater resistance to accidental blows to nozzle passages.

Work Bench

DC5—A heavy duty steel work bench made with 11 gauge prime steel top and 13 gauge prime steel channel type legs is announced by Tri-State Metal Products, Inc. The bench is 32" high, 28" wide, 72" long and weighs 150 lbs. Designed for long, hard usage, this work bench is reinforced with cross members.

Battery Charge Indicator

DC6—A battery charge indicator, dashboard mounted on industrial trucks, gives the momentary charge condition of the battery, keeping the operator informed as to its state of charge throughout the shift. Developed by the Gould Storage Battery Corp., the instrument is priced lower than similar instruments, has the ability to report the state of discharge at any time and is tamper-proof. Indicator is marked off into four differently-colored sections—green for ½ to full charge, yellow for ¼ to ½ charge, red for 0 to ¼ charge, and pink to indicate battery is being used in



overcharged condition. Gauge is read while truck is in operation. The instrument can be used with 3, 6, 12, 15, 16, 18 and 24 cell batteries.

Hardness Tester

DC7—Now 65 to 85 lbs lighter because the body is cast in aluminum, the improved Clark Hardness Tester, for the Rockwell testing of hard and soft steel, brass, cast iron, copper, aluminum, etc., has a frictionless spindle to assure correct minor load, positive tripping for a more accurate major load, and a fully-enclosed elevating screw. Zero drag tripping lever overcomes danger of incorrect major load caused by friction of tripping lever on loading beam. Hardness tester is available

in three standard models, with 8, 12 or 16 in. vertical capacity. The company also makes a superficial hardness tester for use on shallow indentations.

Band Saw Cutting System

DC8—A self-contained wet cutting system for use with the Wells No. 5 Utility Model Horizontal Cutting Band Saw is announced by the Wells Mfg. Corp. Similar to those used on other Wells models, the system is said to permit safe use of higher fpm cutting speeds and to increase blade efficiency. Portability of machine is retained by mounting full-area chip pan between bed and legs. Complete system includes fluid tank with centrifugal pump-motor unit and screened intake, plus tubing and flow control valve.

Hacksaw Blade

DC9—A shatterproof, unbreakable, high-speed hacksaw blade developed by the Millers Falls Co. has an extremely hard edge and high resistance to abrasion. Blade can be highly-tensioned and subjected to faster speeds and greater pressures than ordinary blades, without deflection. Manufacturer claims the new blade has reduced cutting costs 20 to 50 per cent in test use in selected shops, and meets all safety requirements.

Pulmonary Apparatus

DC10—An apparatus for treating pulmonary disorders resulting from exposure to certain chemicals, gases or superheated air in industrial processes utilizes "MSA Pneophore", developed during the war to

resuscitate wounded airmen at high altitudes, is now being marketed by Mine Safety Appliances Co. A portable instrument, consisting mainly of three valves, two gauges, rubber tubing and facepieces, the Pneophore differs from a resuscitator in that it administers oxygen with intermittent positive pressure only. Suction that could damage lung tissues is eliminated. Instruments are used on any oxygen cylinder with a MMM standard thread.

Resin Core Binder

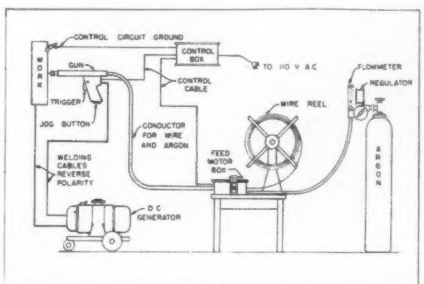
DC11—A liquid synthetic resin core binder, Ibon, developed by the Interlake Chemical Corp., is claimed to have three principal advantages—(1) Cores of maximum baked strength and hardness are obtained at minimum binder concentration and the cores have sharper edges with better detail and greater shock and abrasion resistance (2) Up to 50 per cent faster baking cycles at lower oven temperatures can be achieved (3) Less gassing during baking, casting and shakeout. Successful use of Ibon requires that foundries carry 4 per cent or more moisture in their core mixes, use sand essentially free from clay, and not add bentonite to their mixes. Available in 55-gallon non-returnable steel drums containing 500 lbs of Ibon or in 8,000 and 10,000 gallon tank cars.

Traffic Paint

DC12—Quick-drying, long-wearing "On-crete for Concrete Traffic Paint", developed by Lowebco, Inc., can be used for marking factory aisle border lines, pull-out and storage areas, danger zones, cross-overs, sharp intersections and passageways. Drying in approximately five minutes at 75F or over, the paint can be easily sprayed with marking equipment and is available in federal yellow, traffic white and traffic black. Other colors can be developed.

Welding Process

DC13—A new welding method, known as the "Aircomatic" process and designed for welding heavy sections of aluminum and aluminum alloys at wire feed speeds



ranging from 100 to 300 ipm, has been developed by the Air Reduction Sales Co. Essentially, this process is a form of gas-shielded, metal arc welding, but the conventional non-consumable electrode has been replaced by a continuously fed, consumable wire. This wire is fed to the work through the barrel of a welding gun. The filled metal carries welding current and an arc is maintained between the end of the wire and the work. Power is supplied from a standard d-c welding generator and argon is used as the shielding gas. Application of the process to metals other than aluminum is now under development.

Phosphor Bronze Electrode

DC14—A phosphor bronze electrode for the metallic arc welding of copper, tin bronzes, cast, malleable and galvanized iron, etc., has been developed by All-State Welding Alloys, Inc. The new electrode is designed for bearing and corrosion-resistant applications and for general maintenance and repair welding. Welds made with it have a tensile strength of more than 40,000 psi, and a Brinell Hardness of 70-80. The deposited weld metal is of high density. Phosphor Bronze "A" (Arc) is available in sizes including 3/32, 1/8, 5/32 and 3/16 in.

Package Conveyor

DC15—Latest addition to its postwar line of materials handling equipment is a newly-designed package conveyor announced by the George Haiss Mfg. Co., Inc., division of Pettibone Mulliken Corp. Model 485 conveyor is designed to handle boxes, crates, cases, cartons, etc. weighing up to 500 lbs at the rate of 30 per minute, and is available in standard lengths of 15 to 50 ft and in standard widths of 14, 18, 24 and 30 in. Model 485 has rubber pulley lagging of 1/4 in. tire tread rubber, easily replaceable without removing pulley from conveyor; and telescoping feed end with toggle bolt take-up, adjusted at one point only. Conveyor can be easily moved by one man.

Heavy Duty Crane

DC16—A giant, rubber-tired, two-engined motor crane, said to be the world's largest,

is announced by the Thew Shovel Co., and will lift and transport loads heretofor beyond the capacity of such equipment. The Lorain MC-820 Moto-Crane has a safe-rated capacity, on outriggers, of 45 tons at a 12 ft radius. Weighing 65 tons, the Moto-crane has an overall length, with boom in travel position, of 66 ft. Automotive carrier is specially designed for heavy crane lifting, with weld-fabricated steel frame with multiple straight-beam construction for side members. Crane is equipped with two telescopic outriggers and is powered by two Waukesha diesel engines.

Die Casting Machine

DC17—Said to be the largest of its kind, Kux Machine Co.'s die casting machine is available in three models and has 800 tons locking pressure to form castings in zinc weighing up to 30 lbs, and in aluminum weighing up to 10 lbs. Extremely high injection pressures reach as much as 40,000 psi. Die space of 40 x 25 in. between tie bars and 17½ in. die separation permits accommodation of large dies and production of deep draw castings. Completely electric and hydraulic in operation, the machine's operational speed averages 3 to 4 zinc or 2 aluminum casting cycles per minute. Model BH-40 will produce zinc, lead or tin die castings and has self-contained melting pot and furnace. Model HP-40, for aluminum, brass or magnesium casting, has a cold chamber and ladling injection unit. Model BH-40C uses a gooseneck plunger mechanism for zinc castings and a cold chamber, hand-ladling unit for aluminum.

FOUNDRY *Literature*

Readers interested in obtaining additional information on items described in Foundry Literature should send requests to Reader Service, American Foundryman, 222 W. Adams St., Chicago 6, Ill. Refer to the items by means of the convenient code numbers.

Crucible Melters' Handbook

DC101—A treatise on crucible furnaces and the storing, handling and use of crucibles, the "Crucible Melters' Handbook", recently published by the Crucible Manufacturers' Association and available to foundrymen free of charge, provides a handy pocket reference book for non-ferrous foundrymen. Described in the 16-page booklet are types of crucible furnaces, fuels, storing, handling and use of crucibles, how to counteract crucible dampness, crucible annealing, charging, furnace tending, pouring and proper use of tongs and shanks. Tables showing melting points of various metals, standard sizes of crucibles and typical non-ferrous alloys are included for ready reference.

Cabinet Ovens

DC102—Laboratory and standard cabinet ovens are described in detail in Young Brothers Co.'s 8-page bulletin, "Cabinet Ovens", now available gratis. Typical applications, automatic temperature control heating rates, structural advantages, outstanding features, baking space and dimension charts are described in the booklet. Young Bros. ovens, each of which is illustrated in the booklet, are suitable for either electric, gas or steam heat and are designed to assure temperature uniformity throughout the entire work space. High capacity fans aid in the maintenance of equal heat distribution and the compact design of the air recirculating system eliminates the necessity for external, air-restricting duct work.

Bentonite In The Foundry

DC103 — Lowering casting production costs through use of western and southern bentonite is the subject of American Colloid Co.'s recently-issued Bulletin 243, "Economy in the Foundry". The physical properties of southern bentonite (higher green strength, lower dry strength, hot or retained strength, flowability, permeability, sintering point and expansion and contraction) are outlined. Applications of western and southern bentonites to the various divisions of the foundry industry —gray iron, malleable iron, steel and non-ferrous—are outlined separately and in detail. There is a section devoted to tempering containing two charts showing green compression strengths of No. 50 Silica Sand and Michigan City Sand (both 96 per cent sand, 4 per cent bentonite) and illustrating compression strength comparisons between these sands (1) when using Panther Creek (southern) bentonite, and (2) when using Volclay (western) bentonite. Booklet is available free.

Single-Line Buckets

DC104—An unusual amount of comprehensive, accurate engineering data on the specifications and applications of single-line buckets is to be found in Blaw-Knox Co.'s profusely-illustrated, 48-page booklet, "Blaw-Knox Buckets for Single Drum Hoists and Hook-On Applications". Included in the booklet are complete data on uses, specifications, operating advantages, and methods of installation for Single-Line Hook-On Buckets, Extremely Low Head Room Hook-On Type Buckets, Single-Line and Two-Line Ship's Tackle Buckets, Single-Line Direct-Reeved Type Buckets for Permanent Installations, Two-Line Hook-On Type Buckets, Ingot Tongs, Dump Buckets (Tip Over Type) and Bottom Dump Buckets (Controllable Roller Gate Type).

Bearing Maintenance

DC105—Prepared by the Anti-Friction Manufacturers' Association's Engineering Committee, Manual AFBMA—100, "Anti-Friction Bearing Maintenance", is designed to meet widespread demand for the conservation of bearings and to assist repairmen to accomplish this purpose, as well as to provide information on the general handling of bearings. By following instructions given in the 20-page Manual, bearings will be protected from damage and usable bearings can be removed from worn-out equipment, properly cleaned and installed in the same or other equipment for further use. Instructions cover types of bearings in most general use. Copies are available free.

Magnetic Pulleys

DC106—A complete description of features and applications of electromagnetic pulleys and Alnico Magnetic Perma-Pulleys for automatic operation of ferrous and non-ferrous materials is given in two eight-page catalogs recently issued by the Dings Magnetic Separator Co. Both catalogs have been prepared as a ready guide for magnetic separator users in determining the type and size of magnetic pulley most suited to their specific requirements. Catalog C-1001A describes the purpose, operation principle and advantages of Dings Electromagnetic Pulleys. Catalog C-1007A details the features of the newly-developed Perma Pulley. A practical section of both catalogs, "How to Select a Magnetic Pulley", provides a ready reference for determining proper sizes and types of pulleys for individual cases.

Foundry Machines

DC107—Fordath Engineering Company's entire line of British-made foundry equipment is described in an illustrated, 20-page booklet recently published. Briefly described are Fordath's "New-Type" mixers, capable of producing a perfect, homogeneous one-ton batch of Oil Bonded Sand in two minutes, and discharging it in less than 30 seconds. Other foundry machines illustrated are the "New-Type" core extrusion machine, the Fordath cut-off machine for cores, a multiple rotary core machine, a hand-operated junior core machine, stationary sand driers, dual purpose crushers and mixers, stationary pan-type roller mills and blacking mixers. Also described in the booklet are Fordath's "Glyso" core oil compounds, cereal binders and "Fordavol", a volatile liquid for treating molds and cores. Fordath's foundry products have for many years been recognized as reliable standards for the British castings industry, and are today being made available to U. S. foundries. Fordath's Service department and laboratories, staffed with executives from England's leading foundries, is available to users of the Company's products.

Brass Cleaner

DC108—A new method for cleaning brass prior to electroplating is described in pamphlets available free-of-charge from the Oakite Co. This literature explains Oakite's new method embracing use of combined solutions of two new materials, Compositions 91 and 91-A. This combination readily removes buffing compounds, cutting oils, forming oils and shop dirt contaminations. The first of these materials is a specialized cleaner, while the second helps prevent the formation of tarnish on brass parts and gives the resulting solution excellent chronic acid tolerance. Combined solutions of these materials perform effectively in any of the established pre-cleaning sequences of the plating industry and offer good cleaning action, resistance to tarnish on brass, free-rinsing action, freedom from surface scum, effective performance with hard water, high conductivity and adaptability.

PERSONALITIES

(Continued from Page 73)

intendent of the Tennessee mill of Ayers Mineral Co., Zanesville, Ohio, prior to 1943. Mr. Anselman went to Lewis Institute, Chicago, and served an apprenticeship at Western Electric Co., Inc., in that city. A member of the A. F. S. committees on Deformation (Sand Division) and Analysis of Casting Defects (Gray Iron) he contributed greatly to the A. F. S. publication ANALYSIS OF CASTING DEFECTS.

G. E. Seavoy, vice-president in charge of the Process Sales Division of the Whiting Corp., Harvey, Ill., will direct all field sales operations for Whiting, including advertising, field erection and service. **M. J. Rice,** vice-president in charge of Industrial Sales, will direct all of the Company's product sales divisions, according to Whiting President Stevens H. Hammond. The appointments are the first step in a program to streamline and strengthen Whiting's sales organization in a period of growing competition.

LeRoy E. Taylor has left Covel Manufacturing Co., Benton Harbor, Mich., to become service engineer for Goebig Mineral Supply Co., Chicago, dealers in molding, core, and blasting sands. He visits foundries in Illinois, including the Chicago area, and part of Indiana. Prior to working for Covel, where he spent about a year in charge of sand and refractories, Mr. Taylor worked 13 years for Illinois Clay Products Co., Chicago.

Paul E. Butzin, formerly with the Delta Manufacturing Division of the Rockwell Manufacturing Co., Milwaukee, recently returned to Delta to accept a position as Director of Engineering. Mr. Butzin was the first permanent design engineer employed by the company, from 1939 to 1942, and left to become works manager of the Milwaukee Gear Co.

OBITUARIES

Gordon G. Pierson, vegetable glue chemist with the Perkins Glue Co. for more than 25 years and an outstanding authority in the field, died of a heart attack October 14 in Lansdale, Pa. Mr. Pierson joined the company in 1923 after receiving his Master's degree from the University of Wisconsin. He was also a graduate of the University of Illinois and attended the University of Indiana.

Ernest Bancroft, Jr., 42, general manager and assistant treasurer of the Floyd-Wells Co., Royersford, Pa., died October 20 in Chicago of a heart attack. Mr. Bancroft, who had been associated with Floyd-Wells since 1936, was president of the Manufacturers Protective and Delevopment Association and a member of the Board of Trustees of the Cooking and Heating Appliance Manufacturers, Washington, D. C.

Robert Wray Porter, 60, assistant to the president of the National Radiator Co., Johnstown, Pa., died October 26 at his home in South Orange, N. J. From 1931 to 1933, Mr. Porter was associated with National Radiator Co. as a management consultant, specializing in sales promotion, advertising and marketing problems. In 1946, Mr. Porter accepted his appointment as assistant to the president. He was the author of many articles on statistical controls in the metals industries.

John N. Sumner, 47, pattern engineer with the Foundry Division of the Eaton Manufacturing Co., Vassar, Mich., since 1934, died at his home in Vassar late in October. Canadian-born, Mr. Sumner served his patternmaking apprenticeship at Locke Pattern Co., Detroit, where he attended business college at the same time. Mr. Sumner was later employed as patternmaker by the Dodge Motor Co., the Ford Motor Co., and the Oakland Motor Co., prior to joining Eaton in 1934.

Charles Y. Clayton, 56, professor of Metallurgical Engineering at the Missouri School of Mines and Metallurgy, died June 27 at his home in Rolla, Mo. A graduate of the Missouri School of Mines and Metallurgy in 1913, he immediately joined the faculty, remaining there until the time of his death. Professor Clayton served for many years as consulting engineer to the United States Bureau of Mines. A member of A.F.S., MMSA, ASM, AIMME, and the British Iron and Steel Institute, Professor Clayton was nationally known for his metallurgical research work, and for his many writings and lectures on the subject.

FOUNDRY FIRM Facts

Beardsley & Piper, a division of **Pettibone Mulliken Corp.,** Chicago, has just completed a $50,000 addition to its plant. An air conditioned paint house, the new addition contains water wash spray booths and will be used for painting the company's foundry equipment and other manufactured products.

The acid and basic melting departments of Pettibone Mulliken Corp. have been combined to achieve greater efficiency. Benefits include need for only a single metal storage area and easier molten metal handling. The cleaning facilities are being reorganized for convenience in handling heavier castings.

Air Reduction Co., Bethlehem Steel Co., and **Koppers Co., Inc.,** jointly announce that the first designed and constructed plant in the United States for production of low-purity oxygen is now in operation at the Johnstown Works of the Bethlehem Steel Co. Equipment was designed by Air Reduction and installation handled by Koppers. The plant's output will be used by Bethlehem for experimentation in the use of oxygen for the enrichment of air blast in blast furnaces. Results of these experiments will be made available to the entire steel industry later.

Whiting Corporation's Board of Directors has announced that it will henceforth hold its meetings in important industrial areas throughout the country. This policy is expected to enable the Board to become more familiar with business conditions in those areas. The first such meeting was held November 16 at the William Penn Hotel, Pittsburgh, with Board Chairman Gen. Thomas S. Hammond, presiding.

International Nickel Co. climaxed its 25th Annual Sales Conference October 29 with a dinner at the Hotel Commodore, New York City, honoring the Company's distributors. Inco President and Board Chairman Robert C. Stanley presented testimonial scrolls and sales awards to the distributors.

D. J. Murray Mfg. Co., Wausau, Wis., recently organized the Murco Quarter-Century Club for members and officers with over 25 years' service to the Company, at a dinner meeting. Club officers elected are: president, F. C. Boyce, Company president; and vice-president, S. D. Payzer. A. W. Plier, who is secretary of the Company, was appointed permanent secretary of the Club. Gustav Behnke, who has 42 years' service with the 63-year-old Company, is the oldest employee. Each member received a gold wrist watch.

Huber Manufacturing Co., Marion Ohio, manufacturers of road building and maintenance equipment, recently moved into its new foundry, adjacent to the factory built last year. The foundry building occupies 26,400 sq. ft., is of brick and steel construction with an asbestos roof. More light and air are features of the foundry, which houses a 5 x 48 ft. cupola, molding, core, pattern, cleaning and shipping departments. A 7½-ton capacity, 60 ft. span crane eliminates manual moving of ladles, sand moves automatically in and out of bins in the core room and high speed grinders clean the castings. These operations were manual.

Maurice N. Trainer (left), first vice-president of the American Brake Shoe Co., accepts the bronze "Oscar of Industry" trophy from Weston Smith of Financial World magazine for the best 1947 annual report to stockholders in the railroad equipment industry, at a banquet held on October 21 in New York City.

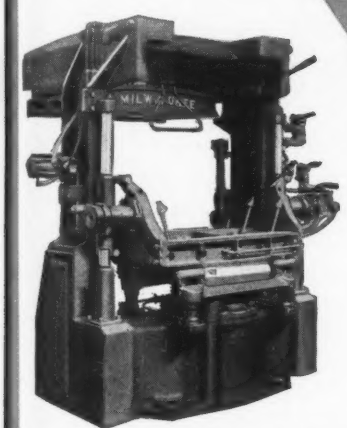
The Carborundum Company, Niagara Falls, N. Y., announces that a new type of kiln it is using for the production of grinding wheels permits scientific control of the firing cycle—permitting greatly increased uniformity in grinding wheels and more latitude for the development and selection of bonds. Other results obtained from use of the new kiln are time savings in the firing cycle of grinding wheels, organization of grinding wheel production on a straight-line basis. These important improvements in grinding wheel service will be reflected in faster delivery schedules and accelerated handling of orders requiring special manufacturing treatment, Carborundum officials state.

The No. 1 blast furnace at the **American Steel & Wire Co.'s** Donora, Pa., Steel & Wire Works has been blown out for relining after producing over two million net tons of pig iron. Blown in on January 18, 1941, the furnace has been in continuous operation since.

This exhibit of the Standard Foundry Co., Racine, Wis., was viewed by more than 45,000 persons at the Made-In-Racine, Wisconsin Centennial Exhibition held this summer. The exhibit compared coke cupola heating with Standard's electric heating process for casting cylinder blocks.

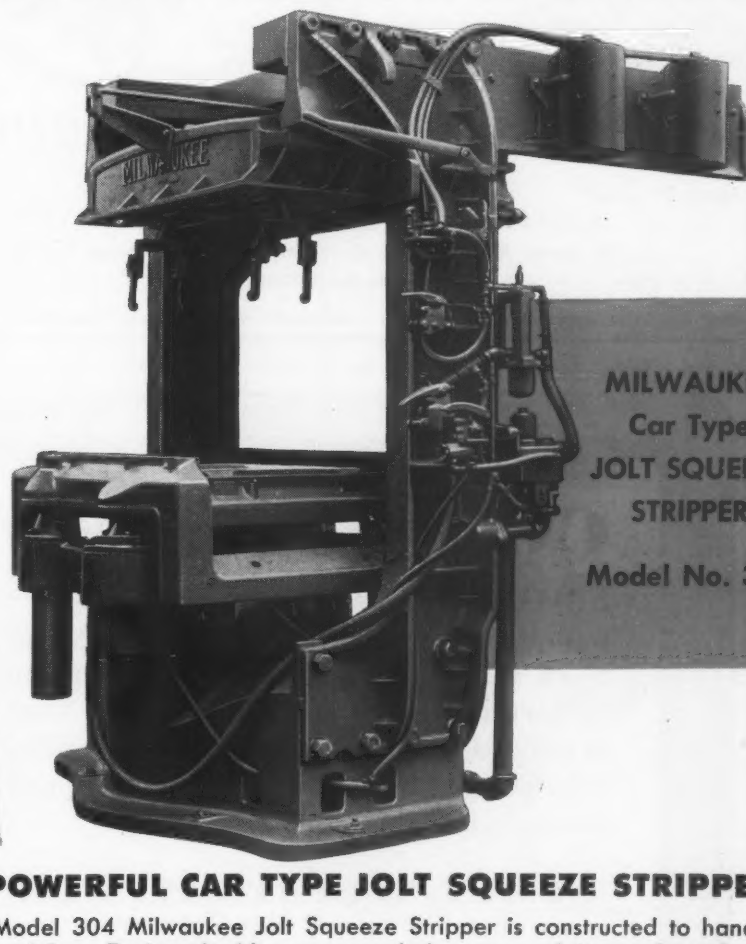
POWER *plus!*

POWER plus speed and safety are qualities characteristic of MILWAUKEE Foundry Machines. These better molders have a surplus of power and ruggedness due to careful design and precision workmanship. High stresses and strains eliminated by ample design. Unnecessary fatigue and manual effort by operator have also been eliminated. Moving parts are held to a minimum and are easily replaceable. Milwaukee molders give you power to handle large flasks quickly and easily . . . power to stand up under continuous, fast production schedules.



MODEL NO. 307 MILWAUKEE JOLT SQUEEZE ROLLOVER DRAW

A fast molder with automatic leveling and smooth pattern draw. Combines jolt, squeeze, rollover and pattern draw in the simplest possible operating cycle. Assures powerful, accurate, precision performance under continuous, difficult conditions. This model has an 1800 lb. jolting and 50000 lb. squeezing capacity at 80 lbs. line pressure. Handles flasks 47" in width.



MILWAUKEE
Car Type
JOLT SQUEEZE
STRIPPER

Model No. 304

NEW, POWERFUL CAR TYPE JOLT SQUEEZE STRIPPER

The new Model 304 Milwaukee Jolt Squeeze Stripper is constructed to handle extra heavy jobs. Equipped with car-suspended squeeze platen and overhead mold removal, 36" maximum strip frame opening and draw of 12". This stripper has a 3000 lb. jolting and 56000 lb. squeezing capacity at 80 lbs. line pressure. Accommodates flasks with 36" maximum width. Poppet type valve control brings heavy impact against squeeze platen increasing penetration to produce uniform molds with less jolting. Pattern drawing mechanism operates automatically when squeezing pressure is released.

New **EASY CREDIT TERMS!**

All Milwaukee Foundry Equipment may now be purchased on convenient credit terms. Write for complete details.

MILWAUKEE *Foundry Equipment Co.*

Castings are Permanent

3238 W. PIERCE STREET, MILWAUKEE 4, WISCONSIN, U.S.A.

CHAPTER ACTIVITIES

(Continued from Page 78)

Jennings said, adding that if he is refused the assistance of these helpers his wages must remain high, or the worker will seek employment elsewhere. A large portion of workers today, he said, are working at the job that will pay the most money and consider their job as "a place to earn money to do the things I like to do". "Men produce good work when they like their jobs," Mr. Jennings said, "but when they love their jobs they produce masterpieces."

Each plant operation must be considered in the light of its ability to be run with the least mental or physical concentration on the part of the operator. This trend of shifting away from responsibility is seen in the increased number of supervisors, inspectors and quality men, Mr. Jennings said. He added that each operation must be policed regularly to insure quality and maintain the manufacturers reputation.

Steady replacement of outworn equipment and addition of modern equipment insures continued progress and is axiomatic in American business, Mr. Jennings said, but, he warned, don't overdo it, watch your financial situation and keep solvent, Too many manufacturers, he said, cheerfully borrow and spend all they can, and when the "bust" comes they find they have provided an excellent factory for the man who buys them out. Looking around, he said, it is easy to find plants no longer operated by the men who started them, and warned his listeners to "watch Old Man Overhead."

If the pressure is so great that it is absolutely necessary to modernize on a large scale, it is best to obtain the services of a qualified engineer to help with plant problems, Mr. Jennings said, citing the proverb, "He who doctors himself has a fool for a patient." "Your type of work and method of operation makes your needs different from those of the fellow down the street," he said. "Don't buy something because it works well for Joe."

Mr. Jennings urged his listeners to mechanize now, providing they can do it and still keep their cash balances in good shape—and added

that the more that is produced, the more jobs are created. He cited an example of this at John Deere, where the sales force has found that for every 20 tractors produced, one new job is created in sales, parts, or service. He concluded by warning the foundrymen present to remember that "the man who buys your castings will not sell them at a loss —don't *you*."

British Columbia

Norman Terry
Canadian Sumner Iron Works, Ltd.
Chapter Secretary-Treasurer

SCIENTIFIC CONTROL OF CARBON in melting cast iron in foundry cupolas was the subject of a talk given by W. W. Levi, Lynchburg Foundry Co., Lynchburg, Va., before one of the largest audiences of the year, at the Chapter's November meeting.

Mr. Levi explained his company's method of scientifically controlling and analyzing metal used in the production of iron castings. The control of carbon in the production of cast iron is all-important, he said. Mr. Levi's talk was one of a series of lectures being conducted by the Chapter in connection with the evening Lecture Courses being held weekly at the Vancouver Technical School under Chapter sponsorship.

Speakers at regular Chapter meetings thus far this season have included National Director Bruce L. Simpson, who opened the 1948-49 season September 21 with a talk on the *"Development of the Metal Castings Industry"*, in which he discussed the historical highlights in his book of the same name.

The second technical meeting was held October 19 with Clyde A. Sanders of the American Colloid Co. speaking on *"Control of Foundry Sands"*.

Saginaw Valley

K. H. Priestley
Vassar Electroloy Products, Inc.
Chapter Reporter

NON-FERROUS FOUNDRY NIGHT, held November 4 at the Fisher Hotel, Frankenmuth, Mich., was attended by 180 foundrymen, including the staffs of Dow Chemical Co., Brisk Foundry & Machine Co., and the City Pattern & Engineering Works, who were introduced by M. V. Chamberlin, Dow Chemical Co. and Joseph E. Winston, City Pattern & Engineering Co.

The technical program featured

a round table discussion on gating and risering, covering light metals, gray iron, and brass and bronze. Carleton C. Hitchcock of R. C. Hitchcock & Sons, Inc, Minneapolis, led the discussion on light metals, with C. E. Nelson, Dow Chemical Co., acting as technical chairman. Charles Schneider, Brisk Foundry & Machine Co., led the discussion on brass and bronze, with J. E. Winston as technical chairman.

In the light metals section, Mr. Hitchcock discussed the production of light metal castings in sand and permanent molds. He described the use of inserts in aluminum and pointed out that it is difficult to have aluminum "lay" tightly to the surface of a steel insert. A successful method, he said, consists of grit blasting the inserts and heating for 15 min. at 1200F. Mr. Hitchcock warned that steel screens and inserts should be melted out rapidly and removed from the melt to prevent iron contamination. The oxide content of the metal, he said, has a bearing on the effectiveness of risers and large oxide concentrations prevent proper feeding.

A lively discussion period followed Mr. Hitchcock's talk, and he later presided at a clinical examination of a number of defective castings and recommended procedures and foundry techniques for correcting these defects.

Northwestern Pennsylvania

James J. Farina
American Sterilizer Co.
Chapter Reporter

Refractories for the foundry were discussed by William H. Owen of the Harbison-Walker Refractories Co., Pittsburgh, featured speaker at the October 25 meeting, held at the Moose Club, Erie.

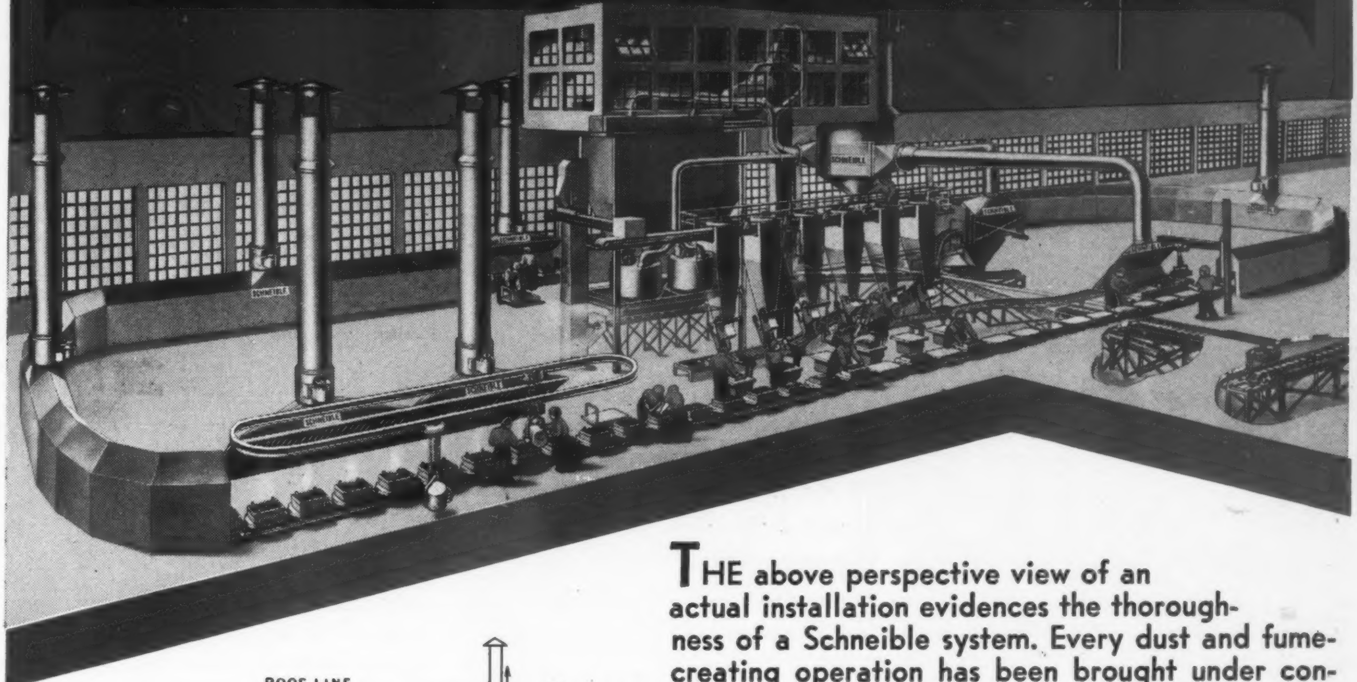
Mr. Owen, speaking on the general applications of refractories in the foundry, cited the increasing use of refractory skimmer cores because of their ability to withstand high pouring temperatures.

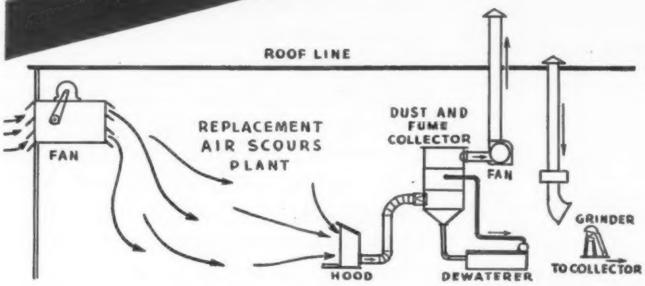
The coffee speaker of the evening was Carl J. Mizenberger, manager of the Erie office of the Pennsylvania State Employment Service, who explained the functions of his office and described the "tight" labor conditions in the Erie region and their effect on local industry.

In an effort to combat public

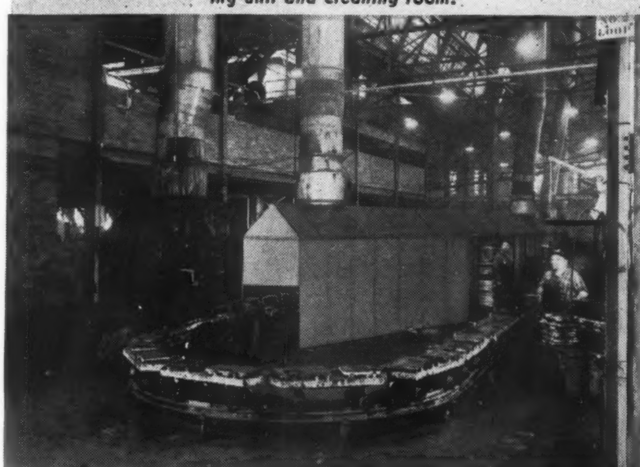
(Continued on Page 90)

This Mold Conveyor Unit has Complete Schneible Dust Control and Ventilation





Schematic method of introducing replacement air in molding unit and cleaning room.



Mold cooling and dump-off ventilation; part of a Schneible System on snap flask work in a malleable iron foundry.

THE above perspective view of an actual installation evidences the thoroughness of a Schneible system. Every dust and fume-creating operation has been brought under control and adequate ventilation for all working zones has been provided.

The benefits of clean air, with resultant increased working efficiency and output, have been made permanent for the various production phases; moulding, pouring, cope shake-out, clamp removal, cooling, drag shake-out, sand conditioning and casting handling.

In this installation the Schneible Multi-Wash Collector—the heart of the Schneible System—is rendered most effective by the proper application of hoods and connections to all dust and fume-creating operations and the correctly engineered application of ventilation for providing replacement air.

Substantial dividends are being paid by Schneible Multi-Wash Systems in mold conveyor foundries, and in a long list of ferrous and nonferrous roller conveyor, floor and pit foundries, as well.

Send for Bulletin 47—"Schneible in the Foundry Industry."

CLAUDE B. SCHNEIBLE CO.
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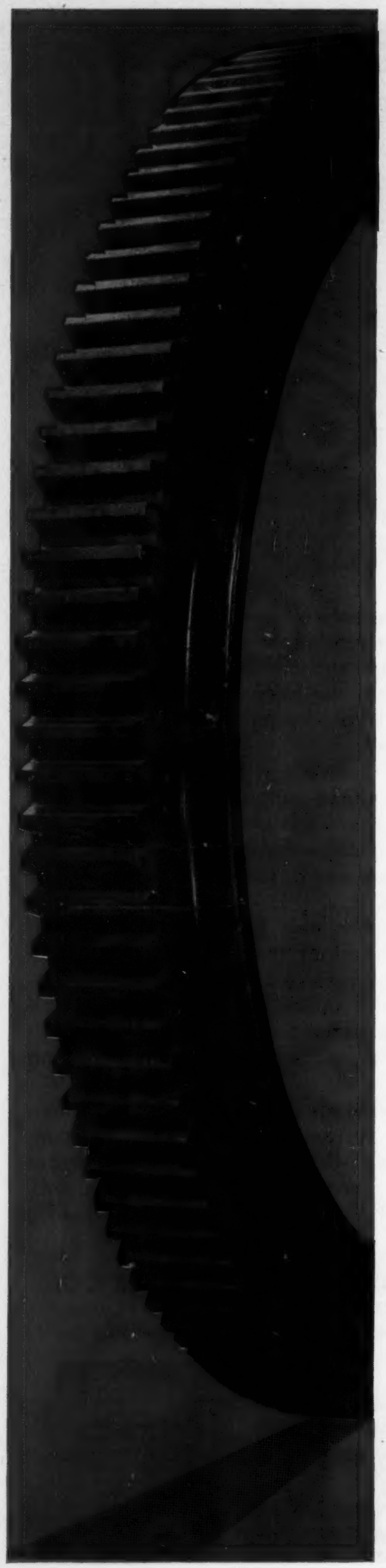

CHAPTER ACTIVITIES

(Continued from Page 88)

resistance and parental objections to foundry work, Mr. Mizenburger said that he has consulted with the local school authorities and has gained their cooperation, and has enlisted the aid of the Northwestern Pennsylvania Chapter. The State Employment Service, he said, is to sponsor a series of radio talks to alleviate this attitude.

Oregon

W. F. Helber
Electric Steel Foundry
Publicity Chairman

A CAPACITY CROWD turned out for the season's first meeting, held September 23 at the Heathman Hotel, Portland. Following dinner a motion picture, *"The Story of the Chilled Car Wheel"*, was shown.

"The History and Development of the Castings Industry", a talk condensed from the book of the same name, by A.F.S. National Director Bruce L. Simpson, was illustrated with slides and featured several anecdotes and sidelights from the long and interesting history of the foundry industry, and resulted in a feeling of pride among the audience in being part of an industry that has contributed so much to the world's progress.

After the meeting, Mr. Simpson talked with members of the audience and autographed copies of his book, DEVELOPMENT OF THE METAL CASTINGS INDUSTRY.

Chesapeake

Jack H. Schaum
National Bureau of Standards
Chapter Reporter

NORFOLK NAVY YARD was host to the Chapter in a day-long visit on September 24. Over 50 members who traveled to Portsmouth were well-rewarded by a detailed inspection of foundry facilities conducted by Master Molder S. W. Brinson. Much interest was evidenced in the foundry's completely mechanized sand handling equipment. The foundry makes both ferrous and non-ferrous parts for ships being constructed or repaired in the Yard.

After lunch, the group was conducted through the "Midway", one of the world's largest aircraft carriers. Special buses then took the group through the Yard and along

the waterfront to view the deactivated "moth ball" fleet.

The evening session was held in Norfolk, where more than 70 members and guests had dinner, followed by a humorous talk by S. W. Brinson.

Technical Speaker J. A. Duma, Norfolk Navy Yard, addressed the group on *"Practical Hints on Melting Brasses and Bronzes"*. In his talk, Mr. Duma advised melting under a slightly oxidizing atmosphere, pouring each alloy at its optimum temperature, cautioning against hydrogen contamination. He described a test for rapid determination of zinc additions—by measuring specific gravity. The meeting adjourned early so part of the group could leave in a special car chartered from the railroad.

Northern California

Jack F. Mainzer
Pacific Brass Foundry
Publicity Chairman

THE TENTH ANNUAL Golf Tournament of the Northern California Chapter was held October 15 at the Orinda Country Club, Los Angeles. Jay Snyder of Musto-Keenan Co. was chairman of the event.

Golf and horseshoes were the principal features of the outing, enjoyed by more than 140 members.

The meeting following the dinner was social in nature and consisted of a few short speeches, entertainment, and the awarding of prizes. Twenty-seven prizes were given for golf and four for horseshoes, in addition to the grand door prize. Harris Donaldson of the Brumley-Donaldson Co., was low gross winner.

The Chapter held its regular monthly meeting on November 12 at Pland's Broadway in Oakland. W. W. Levi, chief metallurgist, Lynchburg Foundry Co., spoke on *"Carbon Control in the Cupola."*

Washington

Harold Wolfer
Puget Sound Naval Shipyard
Chapter Reporter

"FOUNDRY SAND EVALUATIONS" was the topic of an address by Clyde A. Sanders, American Colloid Co., before the October meeting of the Washington Chapter, held at the Gowman hotel, Seattle.

When choosing a sand mix, Mr. Sanders said, these factors must be

taken into consideration: the finish desired, cost of facings, adaptability to production, and flowability of the sand, which has a direct bearing on running time. Pouring time, he added should be included in the job description and gating systems should be chosen so as to allow the shortest pouring time within reason. The shakeout time, he said, should be determined by the sand mix.

A new job, according to Mr. Sanders, is more easily analyzed by fitting it into an appropriate zone and applying the procedure records dictated for that category. Speaking on density, he said that molds should be weighed, as the variations are indicative of performance.

Other factors to be considered in classifying jobs are:

Sands—consider silica grains in rectangular distribution of round grains. The resulting void spaces account for 47 per cent of the total volume. Staggered distribution reduces voids to 27 per cent of the total. Silica flour is not the answer to increasing density and improving finish, as it lowers permeability.

Fireclay—requires too much water to give moldability and results in pinhole porosity.

Water—high moistures produce washes, cuts and buckles.

Expansion—can best be counteracted by improved grain distribution, rather than use of clay, seacoal, woodflour, Etc.

Sand retention on three adjacent screens leads to expansion defects (single hump sand), Mr. Sanders said, adding that double hump sand produces veins, fissures, fins and cracking of castings. Iron oxide, woodflour and cereals are not the answer, according to the speaker. The tendency is to choose A.F.S. 60 to 65 fineness and to blend several sands to give proper distribution. Low broad hump sand with about 35 per cent on peak screen is good. The speaker recommended blending A.F.S. 50-55 with 70-100, but cautioned against using too coarse a sand to open up the mix because of a tendency to produce a double hump and metal penetration. Take the average, he said, and try to build the center up.

Soft ramming, Mr. Sanders said, makes for poor heat conductivity and insulates at that point, resulting in draws at reentrant angles.

Hard ramming will produce good conductivity to eliminate this defect, and durability of sand at gate areas will result from the increased density. This is another argument for low moisture, the speaker said.

Increased permeability increases shrink, Mr. Sanders said. A natural bonded sand of 40 permeability will have approximately the same mass per unit volume as a synthetic sand of 90 permeability, but the synthetic sand will have the greater tendency to produce shrinks.

In speaking on density, Mr. Sanders said that if a mold taken from the line weighs 165 lbs. one day and the castings are good, and the next day only weighs only 140 lbs., look for soft ramming, metal penetration and cuts in the gates. If the standard mold weight jumps to 175 lbs., he said, scabs, buckles, pulled-down copes or cracks over green sand cores are likely. Be sure to check weights of cores when trouble appears, he cautioned.

At the conclusion of the meeting, Chapter Chairman E. D. Boyle, Puget Sound Naval Shipyard, invited all foundrymen in the area to attend the Shipyard's "Open House", October 30.

Tennessee Chapter

Carl A. Fischer, Jr.
Equipment & Supply Company
Chapter Reporter

"Cupola refractories" was the subject of C. A. Brashares, district sales manager of the Harbison-Walker Refractories Co., at the monthly meeting at the Hotel Patten, Chattanooga, October 22.

Mr. Brashares advised there were generally three methods of making refractories or "fire brick"—the extruded or steam method, the power press method, and by hand. These enjoy sales popularity in the order named, and the larger pieces are generally made by the extruded method. The materials used in the refractories are flint clay, a very hard and strong clay mined in Georgia, Alabama, Missouri, Texas, Kentucky, Pennsylvania, Florida and with a very high fusion point; calcine or pre-burned clay (grog); and plastic clay which forms the bond and together with flint and "grog" form the fire brick.

The extruded method forces the materials through the extrusion machines by steam and it comes out

as sausage does from a sausage grinder; this material is cut by wires into clots roughly to size; then the clots are tempered on hot floor and put into forming machines for forming and shaping.

Power press process or "dry process"—the material is placed in the forms and under pressure of from 4000 to 5000 inches per square inch, and the brick is formed. There is not as much moisture in this process as in the extrusion process.

Hand made process—the "wock" or plastic mud is thrown mechanically into the molds, then placed on hot floor for tempering.

Mr. Brashares called attention to the misuse of the term "burned out" when applied to fire brick. He said this term is applied to brick in error when it is ruined by chemical attack or mis-directed blasts cause the brick to melt. Bricks are not burned out but slagged out and melted out, he said.

The other term misused is "failure." The brick is consumed and has not failed, due to being consumed because of charge mis-directed, causing abrasive action and chemical attack, Mr. Brashares said.

He also advised that the use of water cooling to take heat away is not a cure for cooling cupolas, but instead wastes the heat of the cupola by conducting it away. The modern trend is away from water cooling, he said.

The 70 or more members and guests enjoyed Mr. Brashares' discourse, which he illustrated with slides, and later participated in a question and answer session.

Northeastern Ohio

R. H. Herrmann
Penton Publishing Co.
Chapter Reporter

APPROXIMATELY 225 members and guests attended the chapter's regular monthly meeting October 14 at the Tudor Arms Hotel, Cleveland.

Fred J. Pfarr, Lake City Malleable Co., Cleveland, was technical chairman and introduced S. W. Healy and Norman Henke, Central Foundry Division, General Motors Corp., Saginaw, Mich., who presented a talk and demonstration, *"Progress With Better Methods."*

In their demonstrations they showed coremaking operations before and after a scientific study of operations. Noticeably improved

production with less effort resulted from performing the operations in accordance with methods developed through motion studies.

To illustrate the application of these principles in practice in a production foundry, a motion picture showing "before" and "after" operations at the Saginaw plant of Central Foundry Division, General Motors Corp., was shown.

During the question period it was asked if any trouble was encountered when changing from the old method to the new. In answer to the question, "Do the men complain about making more cores for the same money?" Mr. Healy stated that the idea must be sold to the men, which, he added, is not too difficult if the adjusted standard represents a fair proposition. He recommended stressing the reduced fatigue factor which accompanies the increased production.

In answer to a question about the scrap rate with the new method, Mr. Healy stated that it improved due to proper controls and uniformity of product. Cores, for instance, are more likely to have uniform qualities when made in the same manner by different employees.

With H. G. Waterfall, Wilbur Pattern Works, presiding, more than 50 patternmakers and guests listened to an interesting discussion on plaster process match-plates presented by Luke Beinke, Plaster Process Castings Co. He pointed out that master patterns for such work should be carefully finished to prevent plaster from entering crevices and causing trouble in drawing. Coating on wood patterns should be waterproof. Since wax fillets tend to blister under the heat generated during setting of the plaster, leather or plastic fillets should be used. If patterns are of thin section, it is preferable that they be made of metal to prevent distortion.

Mr. Beinke said that it is not necessary for the patternmaker to supply lightening coreboxes since the plaster molder can make them much quicker and cheaper. Information should be supplied on how the patterns are to be gated as well as where bolting lugs and supporting ribs should be located. To amplify his talk Mr. Beinke showed some slides depicting the various steps in making a matchplate by the plaster process.

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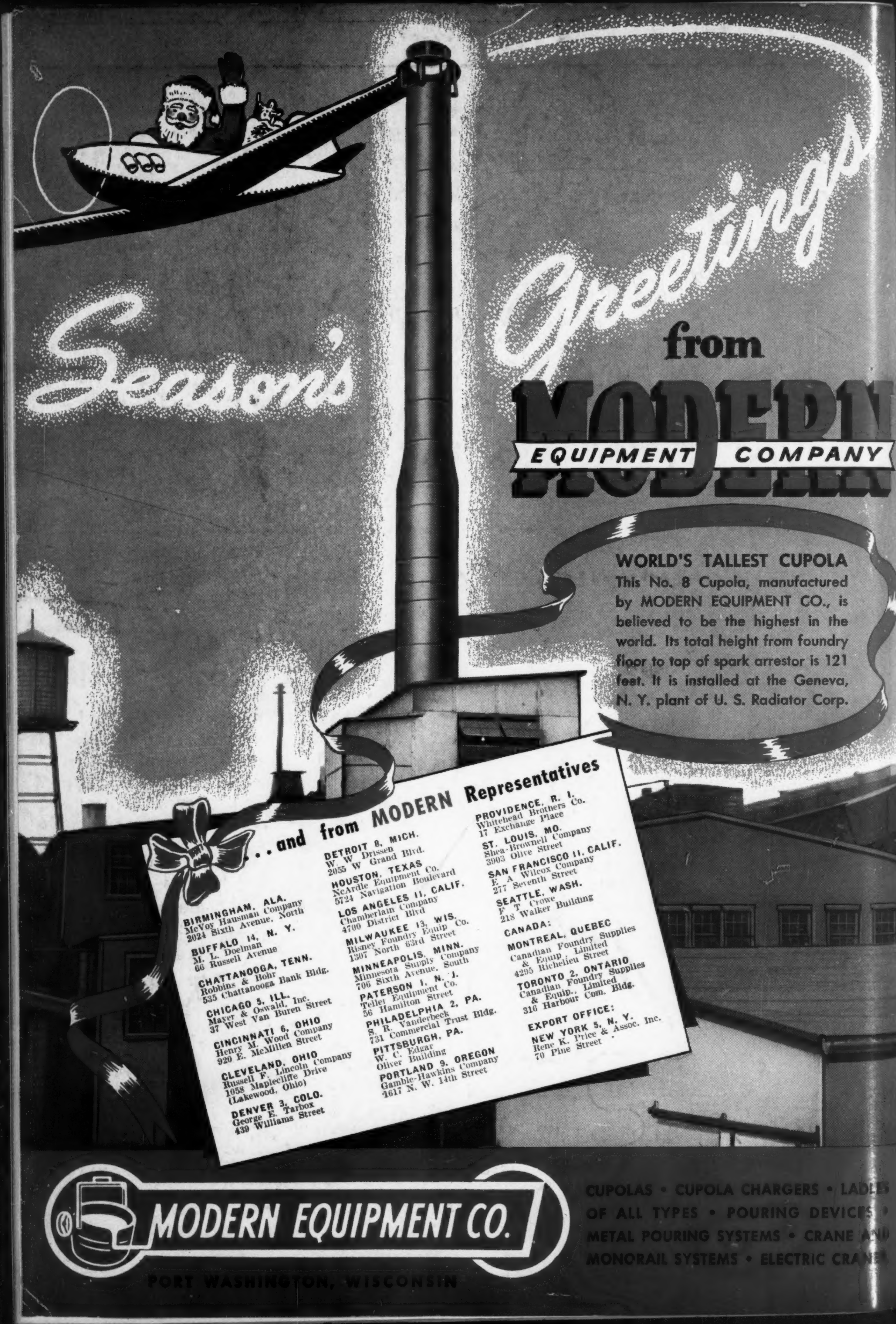

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